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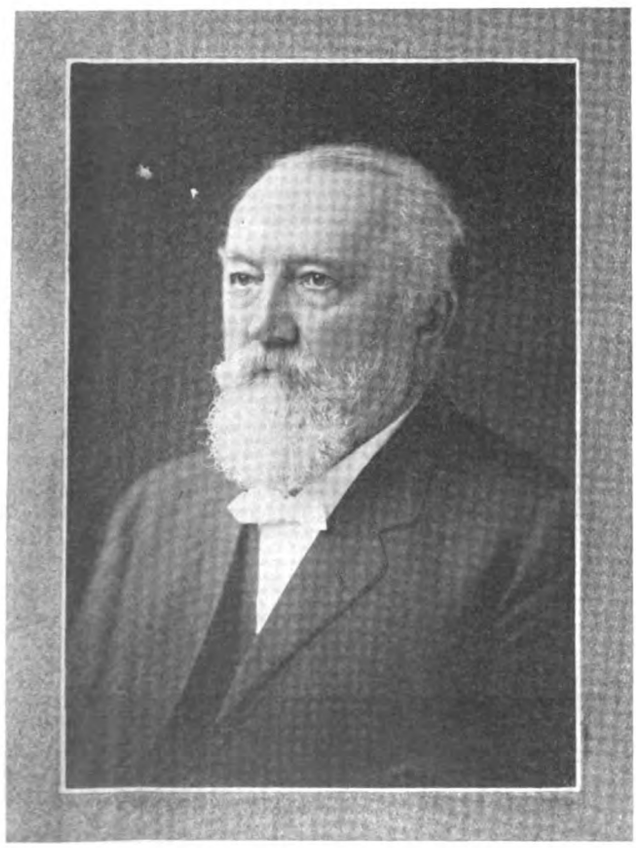
International Navigation Congress

The Deliberations of the World's Foremost Body of Maritime Engineers—Wide Variety of Topics Discussed

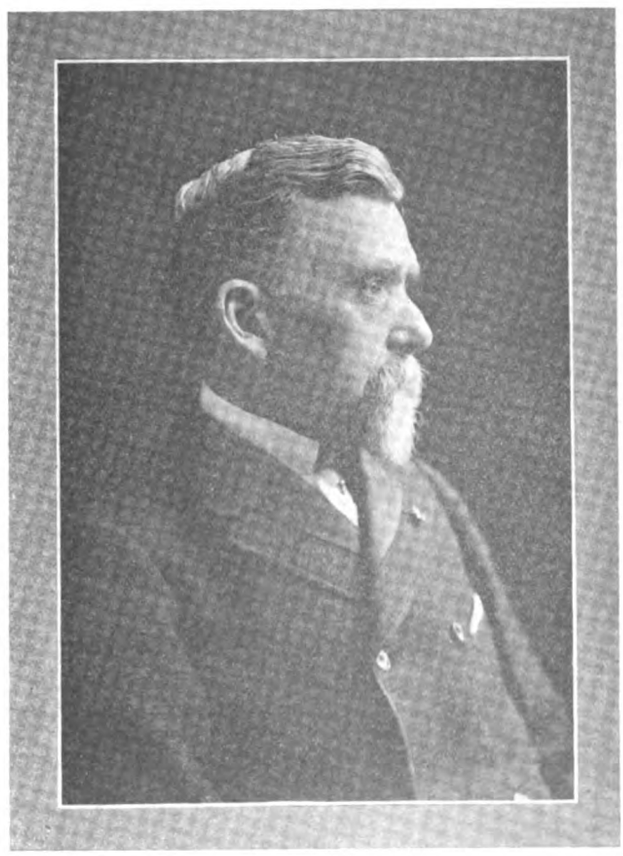
THE Twelfth International Congress of Navigation convened in Philadelphia on May 23, the day preceding having been spent by the permanent commission in organization. Prof. V. E. de Timonoff, of St. Petersburg, Russia, presided. Brigadier General Charles W. Raymond, retired, of Philadelphia, and Gen. W. H. Bixby, chief of engineers, United States army, were chosen as the two presidents of the general bureau of the congress. Col. John Bogart and Alfred Noble, consulting engineers, of New York, were named as presidents of the first section of the congress, which considered questions pertaining to inland navigation, while Elmer L. Corthell, of New York, and Col. H. E. Hodges, assistant chief engineer of the Isthmian canal commission, were named as presidents of the second section, which was devoted to subjects pertaining to ocean navigation.

It was decided by the permanent commission to take no action on the subject of affording ocean passengers greater protection at sea in deference to the German emperor, who has called an international conference to consider the subject with a view of preventing a repetition of such an accident as befell the Titanic.

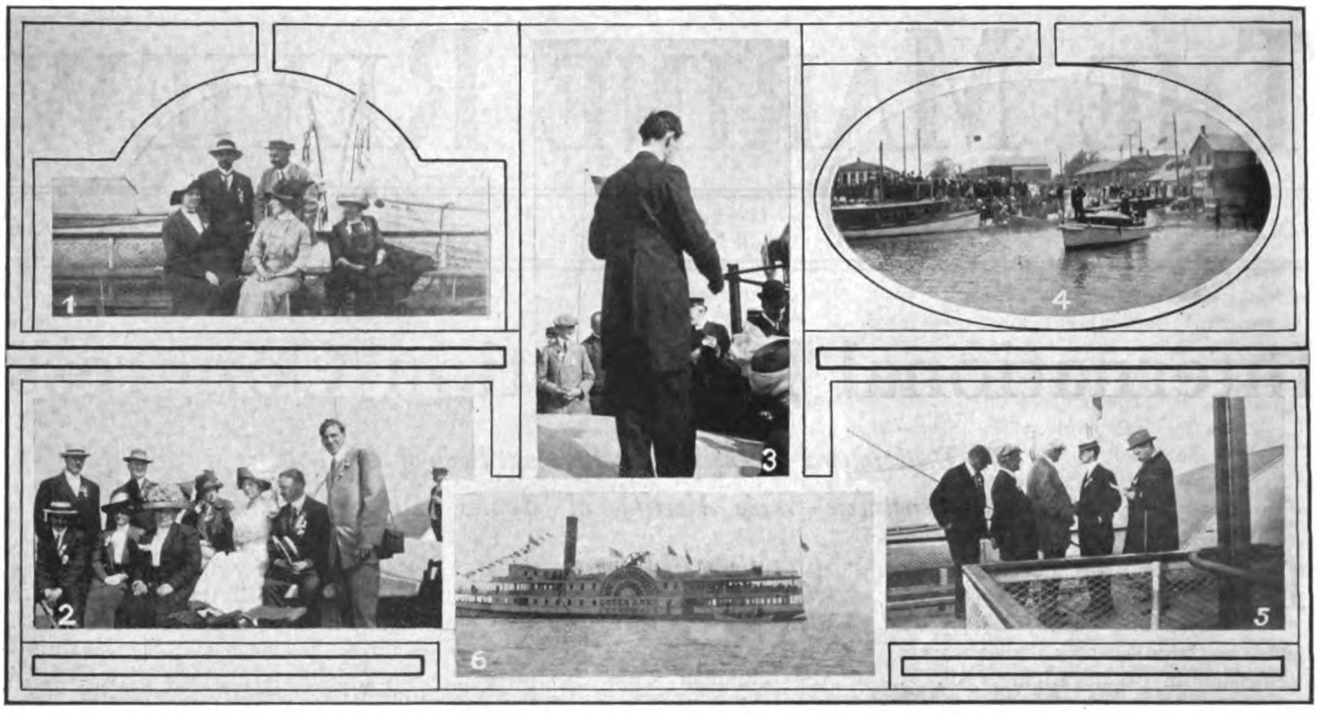
As this is the first time that the congress has ever met in the United States, both state and nation assisted Philadelphia in receiving the delegates. The congress formally opened in the Metropolitan opera house on Thursday morning. President Taft was escorted to the opera house by the First Troop, Philadelphia city cavalry, the delegates in automobiles forming part of the parade. The great building of marble was beautifully decorated with the flags of all nations.



RUDOLPH BLANKENBURG, MAYOR OF PHILADELPHIA



ELMER A. CORTHELL, PRESIDENT OF OCEAN SECTION



1. COUNT NANDOR DE SZABO, BUDAPEST; CAPT. MATZSUMARA, NAVAL ATTACHE, JAPAN EMBASSY, PARIS; MISS SHOPPER, MISS VINCENT AND MRS. GALLAGHER, OF THE RECEPTION COMMITTEE. 2. MEMBERS OF THE DEPARTMENT OF WHARVES, DOCKS AND FERRIES, PHILADELPHIA. 3. CONGRESSMAN J. HAMPTON MOORE; 4. PARTY LEAVING YACHT CLUB AT CAPE MAY TO INSPECT HARBOR; 5. GEORGE SPROULE, SECRETARY AND TREASURER OF CONGRESS; FRED DONNELLY, MAYOR OF TRENTON; J. HAMPTON MOORE; M. DUCROCQ, HAVRE

Mayor Rudolph Blankenburg, of Philadelphia, distinguished himself by delivering his address of welcome in three languages—first in French, then in German, and lastly in English—a feat while common enough in Europe, is very rare in this country. And what he said, too, had weight and dignity.

"You come here to Philadelphia," said he, "a city regarded in the new world as linking the republic with the far-away past; a city with a corporate existence going back more than two and one-quarter centuries; and yet, gentlemen, you represent—many of you—countries in whose eyes Philadelphia, two and one-quarter centuries old, is a mere babe in arms. Going back to the discovery of America and taking the continent as a whole, it staggers the mind to realize that even in 1492, more than a thousand years had elapsed from the time when Rome ruled the world and had reached her highest point of civilization, while that far-distant date was separated by over 2,000 years from the climax of Egyptian art and civilization. To us in America, therefore, you bring by your visit a realization that we are merely in the morning hours of life; that the whole great day of development lies still ahead of us. While a certain humility is born of this realization of our youth and inexperience, there comes with it, gentlemen, a certain sense of satisfaction in recalling the things which we as people have been able to accomplish during the short period of our national life.

The Power of Science

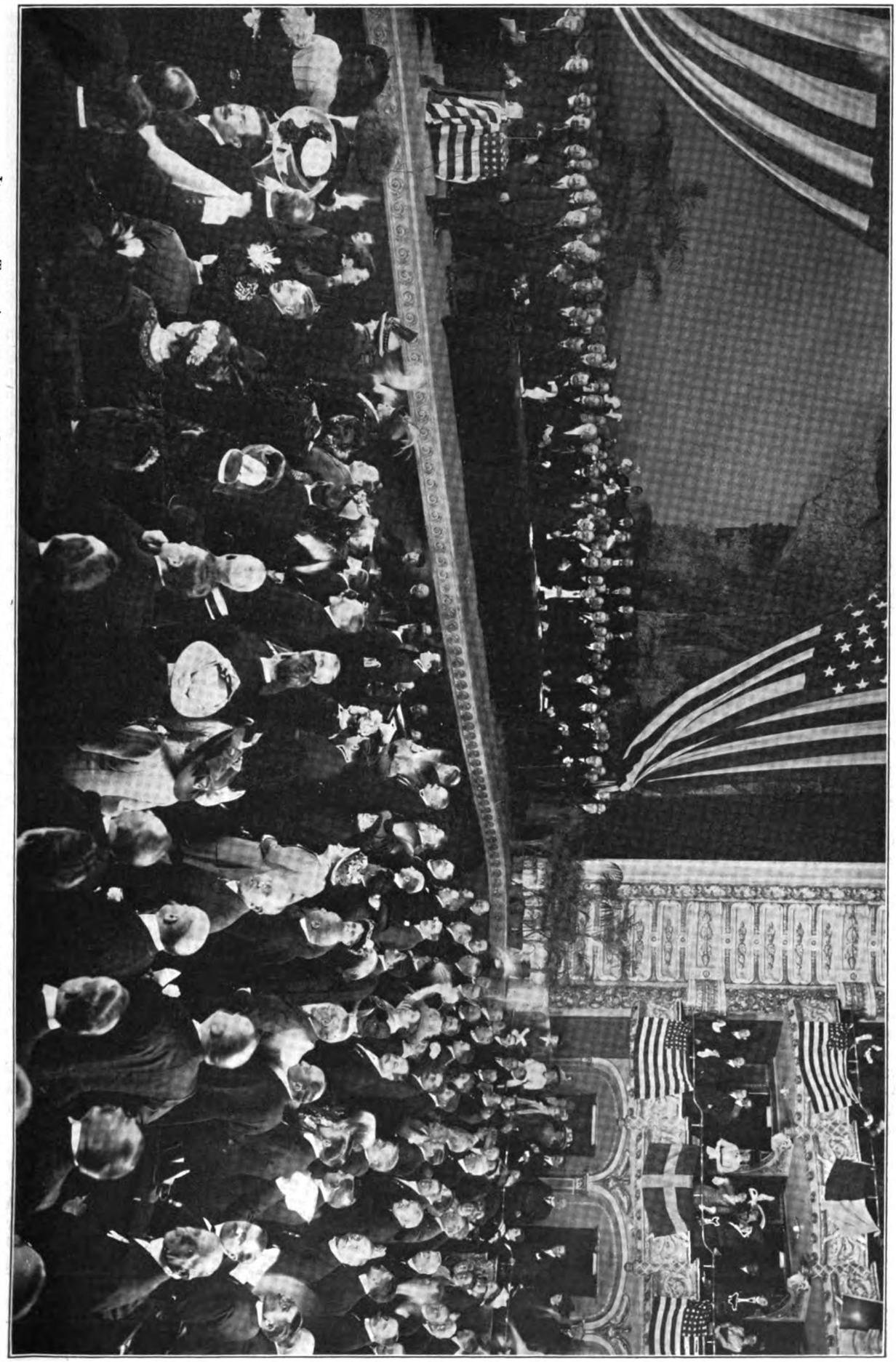
"You represent great scientific development all over the world; you illustrate the power of mind to utilize the gifts of a kind Providence to the benefit of mankind. You represent the truth that the science of government must take cognizance of the powers of science; you come from the older civilization in the older world beyond seas. You come to inspect our works, to measure our performances as they should be measured, fully and fairly; but it is only right that in passing judgment, you should bear in mind the fact that our whole great development along those lines in which you are most deeply interested has been practically the work of only a century.

"It is right that I should bid you welcome to Philadelphia; fitting that as representative of authority in the city which promulgated the declaration of independence, I should welcome here representatives of other and older forms of government. For no serious student of world history will challenge my statement when I affirm that the declaration of independence, prepared in this city, has mitigated conditions of mankind all over the world and has been a distinct, and, in some degree, a directing influence in the changes which have taken place in every government on earth. The tie, therefore, of this abstruse agency binds the whole world to America and through America to Philadelphia, the city of the declaration of independence and the constitution of the United States. For that constitution, also, has proved a model, either in the whole or some of its parts, for constitutional enactments in nearly every other country of the globe.

"But there is a further, and perhaps a deeper reason why there is the element of appropriateness in my standing here to welcome you visitors from abroad. You come from all lands, all advancing peoples. Our country is great because its population has been drawn from all lands and all advancing peoples, and the men who have come here have, we believe, developed, under our freer institutions, more rapidly than they would have developed at home."

Congressman J. Hampton Moore, who presided, then introduced John C. Bell, attorney general of Pennsylvania, who represented Gov. Tener, the governor himself being detained by illness.

When President Taft was introduced the entire audience arose and



PRESIDENT TAFT ADDRESSING THE INTERNATIONAL NAVIGATION CONGRESS AT THE METROPOLITAN OPERA HOUSE, PHILADELPHIA, MAY 23

Photo Copyrighted by W. H. Rau, Philadelphia

gave him a most enthusiastic reception. The president's remarks were purely extempore, but he spoke quite to the point and with great ease, creating a very favorable impression. The president said:

The President's Address

"It gives me great pleasure to attend any congress that is for the promotion of the peaceful arts between the nations of the world. We have been trying to do something in the matter of bringing about universal peace in this country, and we had the assistance of foreign nations in that matter. For the time being we are suffering a little halt, but I wish to say to the representatives of foreign nations abroad that the hearts of the American people beat high for every step toward universal arbitration and peace and the abolition of any method of settling international controversies save by peace and by judicial decision.

"I am delighted on behalf of the people of the United States to welcome the foreign representatives here in this international navigation congress. I congratulate them on having selected this, the natal city of the nation, for their congregations. The universality of the tongue of the mayor is only indicative of the breadth of the hospitality that you will enjoy here.

"It has been said that there is something perhaps for you to be interested in in this country in the development of the engineering problems of navigation. Certainly there is much that you can confer upon this country in the advance which has been made in other countries than this in the use of navigation. Perhaps in the mere engineering problems of treating rivers and streams and lakes we do not suffer in comparison with other countries. But there are certain phases of the navigation problem that to us are most important and in respect to which I do not think I state it too strongly when I say we are very backward. As a nation we like to go fast. When the railway came in the slower navigation of the river and the canal and the lake did not attract us so much, and you who go more deliberately, more thoroughly, were able to unite the advantages of water transportation with railway transportation in such a way as to use both to the height of their usefulness.

"We have yet to learn much from you in the classification of articles to be transported, so that those that are bulky, that naturally pay only a small freight, and may be transported without injury to the interests involved in a very slow way, may be assigned to the rivers and the canals, while that freight that needs quick dispatch may be assigned to the railways and pay a higher rate in accord with the expense of the transportation. Now we have to unite the two. We have to learn how to unite the two methods of traffic by railway and by canal and by river. We are greatly lacking in that kind of terminals that are necessary in order to make the two operate economically, usefully and rapidly, and all those things I doubt not that our representatives in your congress may learn of and profit by from the experience of the older countries of Europe.

The Waterway on the Lakes

"We have, it is true, one waterway on the lakes that perhaps does a greater business than any waterway in the world, and what we have to learn is that the use of waterways must be more or less adapted to the circumstances that surround those waterways and must in the nature of things govern their use. That is that you must have at the end of the waterway something to be carried to the other end, and then at the other end something to be carried back to the first place. If you haven't either, and put a waterway there, it is not going to furnish its own transportation.

"But that transportation by waterway may be facilitated by a proper division of freights, and by proper terminal and connection facilities, I doubt not, and I suppose it is not the subject of dispute, but we have to be patient in the United States. If we do not get a traffic we think ought to be there, in some way or other we want to put it there, and that is not a profitable business.

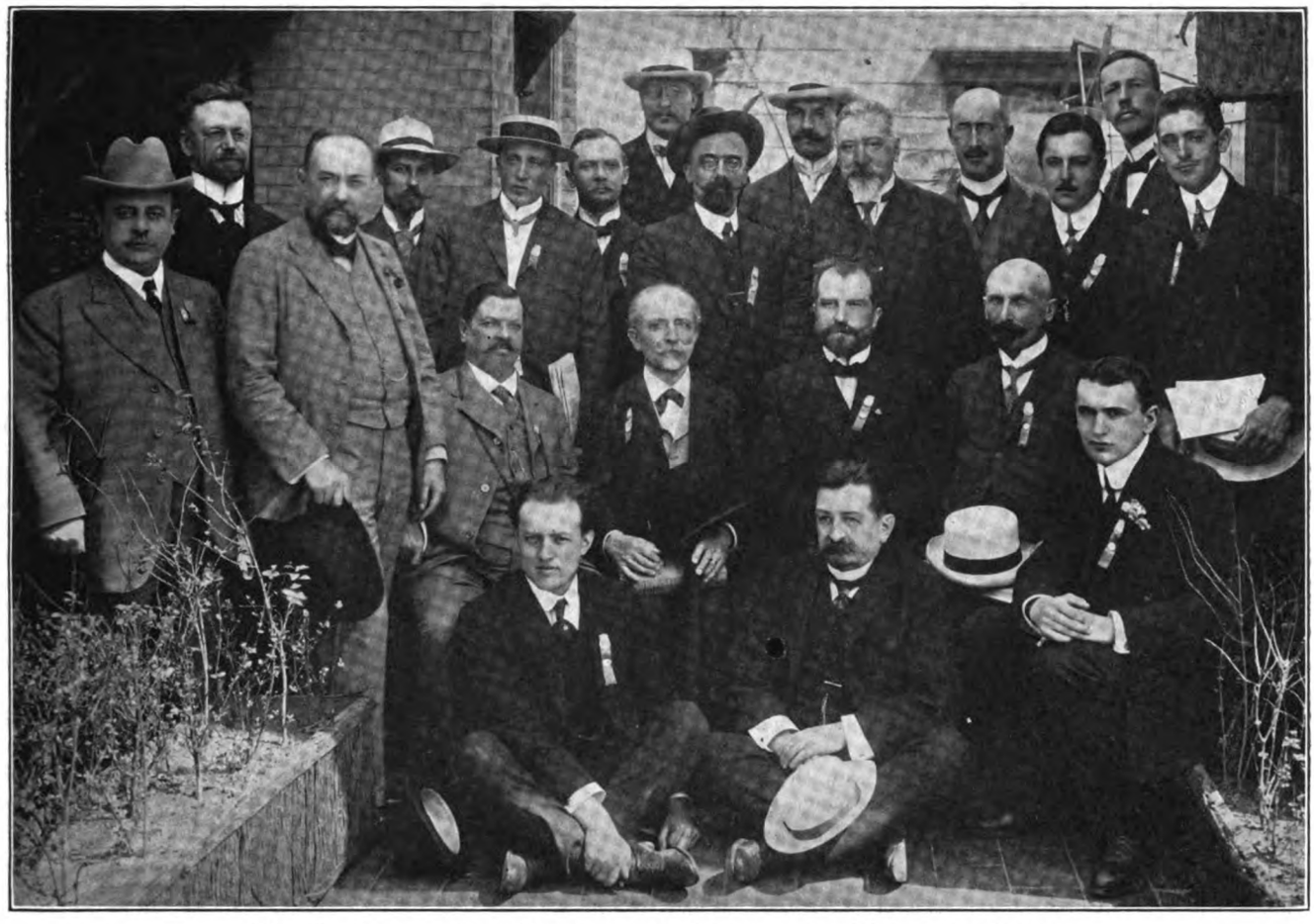
"Now, my friends, I could wish very earnestly that this city of Philadelphia were nearer to the great engineering work of navigation which this nation is engaged in at Panama. I am sure that the foreign representatives, as indeed everybody at all interested in the execution of an enormous work, would revel in the pleasure he would find in spending a week on the narrowest part of these two continents; and I mention that for two reasons only—one to note the fact that when we desired information with reference to that great work in advance of its execution, we invited a commission from the European countries of skilled engineers to help us with their suggestions, and they responded in a way that I shall always feel grateful for, because I was at that time at the head of the war department, in which that commission sat. We have gone on with the work, and I am glad to say that it will be fully completed—certainly within 18 months.

Cost of the Canal

"As in the execution of all such great works, we have made a good many discoveries, we know now a great deal more than we knew then. One of the natural lessons is the expansion of cost, and that which was projected at less than $200,000,000 will cost us about $400,000,000. That is due not alone to the increased cost per unit, but also to the expansion of the ideas of those who were responsible for its construction in enlarging it and making it more suitable to possible growth of trade.

"We speak generally of the Panama canal and hardly realize that when DeLesseps first planned a canal across that isthmus it was to be but 72 ft. wide and 28 ft. deep. Now the canal at its narrowest point is 300 ft. across the bottom, and reaches out into the lake, and there has a channel of 1,000 ft., more than two-thirds of its length, with a depth of 45 ft. The width of the locks is now more, being 110 ft., considerably more than the canal was to be under the first project of Mr. DeLesseps. The canal has also settled a controversy that we assumed the responsibility of deciding in advance, and I think has settled it in favor of those who rendered the decision. That is, that a sea level canal would have been impossible, at least practically impossible; that the conditions are practically prohibitory. The slides which have occurred in Culebra cut, the enormous quantities of water that have discharged themselves through the Chagres river, all show that the time which would have been taken and the money which would have to be expended in order to complete the canal as a sea level canal would have been so great that even the energy of the American people would have halted and their interest would have lagged in view of the length of time that the work must have dragged on. Now it is a practical canal.

"It is one that will pass any vessel through it that is either on the ocean or projected, and unless the American people take some other course than they have heretofore adopted, in respect to the merchant marine, they are not going to have much interest except by way of laying tolls on the merchant marine that goes through there. I hope that some other course may be taken in respect to our for-



THE REPRESENTATIVES OF RUSSIA AT THE INTERNATIONAL NAVIGATION CONGRESS

eign merchant marine that may proportion our use of it to the expense and energy and time and effort that we spent in its construction.

"Of course, the coastwise trade will be a very important trade to us, and the union between the Atlantic and the Pacific seaboards is perhaps to us the most valuable result of the canal. On the other hand, I hope the distinguished gentlemen whom I address will believe me when I say that the construction of this canal by the United States at its sole expense is an evidence of the willingness of the United States to do something for the welfare of the world, and that it will be a fitting monument to the growth of this country that had its birth in this city in 1776 from a straggling series of of colonies of 3,000,000 people to a present population of upwards of 100,000,000; that it shows that that which Charles V had in mind when he first heard of the Isthmus, has finally developed under the leadership and the ingenuity of France, by the American nation, which is always willing to follow a good suggestion, and that it will be regarded as a substantial evidence of the desire of the United States to make closer our relations with all the world, and to show to those who are here now as foreign representatives that there is a moving element among the American people that are determined to accept every evidence of brotherhood in you toward us and to show you the same feeling on our part toward you until we shall have reached a point when we can discard all battleships and meet as brothers, and without the thought of any controversy."

Response of President Timonoff

Brigadier General W. H. Bixby followed the president, the response being made by Prof. Timonoff, permanent president. He paid a tribute to the work which the United States is doing at Panama, saying:

"No other great work now being carried on throughout the world is of such far-reaching and lasting importance as the Panama canal. Never before has a work of this kind on so great a scale been attempted. Never has any work of the kind, of anything approaching the size, been done with such efficiency, with such serious devotion to the well-being of the innumerable workmen, and with a purpose so lofty and so practical. No two men in the service of any government represent a higher, more disinterested, and more efficient type than the two men at the head of this work —Colonel Goethals, the man who is actually doing the digging, and Dr. Gorgas, who has turned one of the festering pest-holes of the world into what is almost a health resort.

"To have an idea of the importance and difficulty of what is being done now on the Isthmus, it is sufficient to compare the natural excavation of the canon of Niagara to that of the artificial cut of Culebra. Both excavations are similar in size, but nature required not less than 35,000 years to make the Niagara cut, and the Americans will make the Culebra cut in six years."

Following the addresses, President Taft held an informal reception to the delegates on the stage. The delegates then returned to the Bellevue-Stratford for a buffet luncheon, which was served in the ball-room and proved very enjoyable. As soon as luncheon was over the engineers divided into two sections, one on inland and the other on ocean navigation and began the serious business of the congress. The attendance at both sections was about equal in number.

Section on Inland Navigation

The Congress Discusses Improvement of Rivers, Dimensions of Canals, Protection of Banks, and Uses of Reinforced Concrete

THE formal meetings of the sections began on Thursday afternoon. The First Section considered inland navigation; the Second Section ocean navigation. The sections obviously met separately and will be dealt with as separate units.

Col. John Bogart, of New York, presided at the session of the First Section, and the first question considered was the "Improvement of Rivers by Regulation and Dredging, and, if Needs be, by Reservoirs. Determination of the Cases in Which It is Preferable to Resort to Such Work Rather Than to Canalization or the Construction of a Lateral Canal."

Several papers upon the subject were submitted by the delegates and for purposes of convenience their conclusions were analyzed by Col. Henry C. Newcomer, corps of engineers, United States army. Such a wide divergence of views was expressed, however, that Col. Newcomer felt that no conclusions could be framed upon which there would be general agreement. He submitted, however, the following conclusions for the action of the congress:

"1—Under the widely varying requirements of navigation, and the very different physical conditions of slope, discharge and nature of bed, no single method of improving the navigability of a river has superior advantages in all cases, but each may in turn be found most satisfactory under special conditions.

Regulation and Dredging

"2—The choice of a method of improvement depends not only on the capacity of the stream for improvement by the different methods, but also on the volume of commerce to be benefited and the resulting cost of transportation, including interest on the cost of improvement, maintenance charges and the cost of carriage.

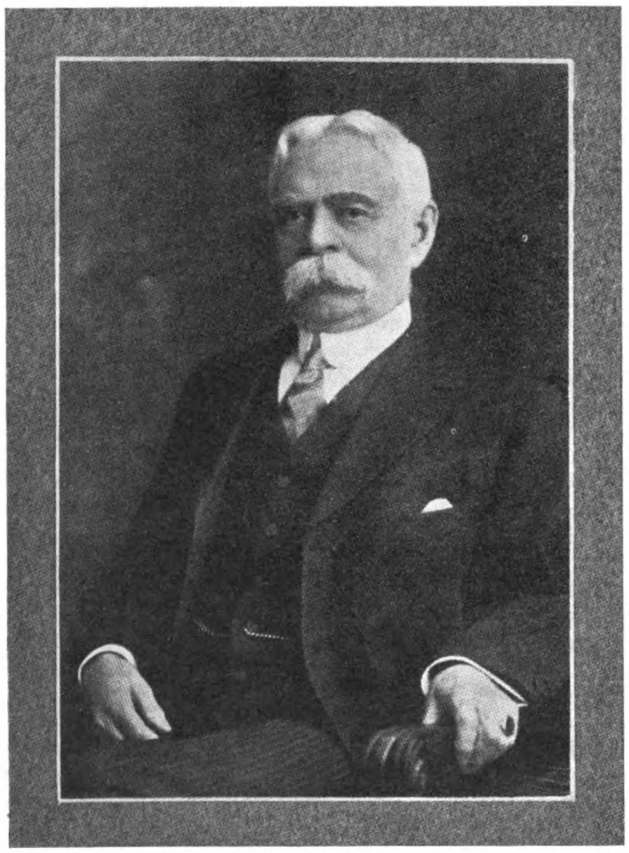
"3—The slope, discharge and nature of bed and banks are the main factors determining the limits and the cost of improvement by the ordinary methods of regulation, dredging and canalization and the prospective tonnage in the main factor determining the justifiable expenditure.

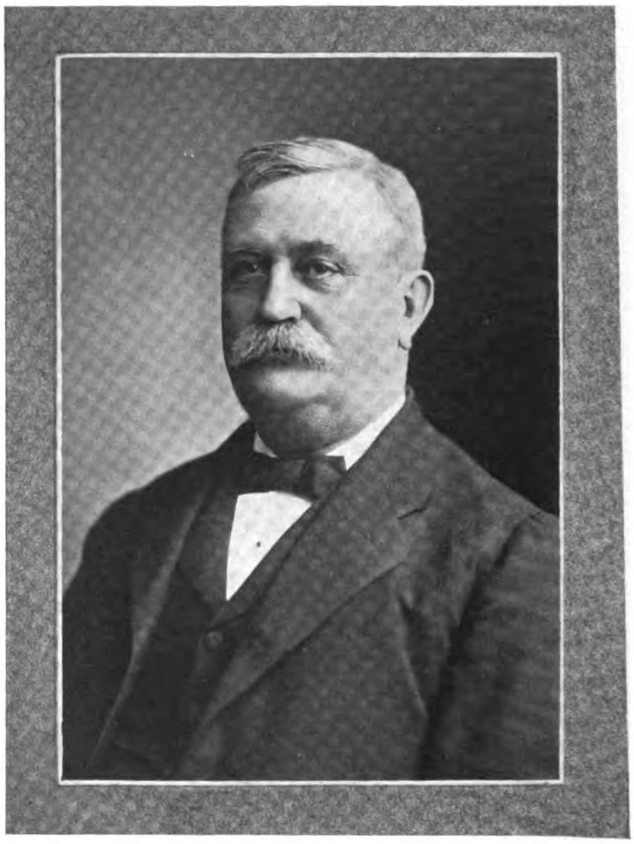
"4—Regulation and dredging, either singly or in combination, are apt to be more uncertain and limited in their results than canalization, but they are usually preferable when the needs of navigation can be satisfied by these means. Otherwise it is generally advisable to employ canalization, using fixed or movable dams, depending upon the limitations imposed by flood conditions and the requirements of navigation.

"5—Lateral canals are usually less desirable than canalization, but may be required under some conditions.

"6—Reservoir control of stream flow, sufficient to meet the needs of navigation, is usually impracticable within reasonable limits of cost, but in rare cases it may be used to advantage to supplement other methods of improvement."

Gen. W. H. Bixby, chief of engineers, United States army, was the first





JOHN BOGART, ALFRED NOBLE

PRESIDENTS OF THE SECTION ON INLAND NAVIGATION

to enter the discussion. "All methods of improving navigable streams are useful," said he, "but most of them depend on local circumstances. The first improvement which all will agree upon is to clear the channel of all natural obstructions, such as rock and other obstacles. Then there should be dredging to get a clear channel of a sufficient depth and a continuation of the dredging, if necessary, and regulation. Navigable streams should also be straightened.

"After that comes the question of obtaining the greatest depth, whether by locks and dams or by lateral canals. It is a question of choice between locks and dams and lateral canals and depends largely on the local circumstances. Reservoirs from merely a navigation point of view are only supplemental to the other necessities which I have enumerated, and should be taken up after the other work referred to has been done. If reservoirs can at one time promote navigation, develop large water power and act as a flood protection they are very useful. The extent of their use, however, must depend on the benefits to be secured and the cost should be paid for in proportion to the benefits obtained. It should be divided up proportionately between the power companies, the land protected from floods and the navigation interests, the greatest costs as a rule to go to the interests other than navigation."

Morris Knowles, of the Pittsburgh flood commission, outlined the work of the Pittsburgh flood commission in its endeavor to relieve that city from floods. It proposes a series of storage reservoirs which could be utilized to maintain a satisfactory navigable depth throughout the year.

T. Wilkinson, of Burlington, Ia., president of the Upper Mississippi River Improvement Association, related what the association is doing for the upper reaches of the Mississippi and earnestly urged the visiting engineers to inspect the dam at Keokuk, of which he gave a most enthusiastic description.

Joseph Ripley, resident engineer of the barge canal at Albany, spoke along the same general lines as Gen. Bixby had spoken.

Conclusions on the Subject

A committee was then appointed to give further consideration to the subject. Its report was as follows:

1. Absence of any Exclusive Method.—The navigability of rivers having but one current can be improved, as it has been stated many times at the navigation congresses, by various methods, such as: Regulation of the bed by permanent works; regulation of the bed by mechanical dredging; increase of depth by an additional water supply furnished by storage reservoirs; canalization of the bed; combined action of the two or more of above processes; construction of a lateral canal. The use of one of these methods rather than another depends upon the special circumstances of each particular case. Among these circumstances, the following are of prime importance: The nature of the river and of its navigation; the existence of objects of improvement other than that of navigability (more especially agricultural, power or sanitary purposes; protection of the banks in the interest of towns, protection against inundations), the degree of the navigability required, the importance of the expected traffic, the resulting cost of transportation, including interest on the cost of improvement, maintenance charges and the cost of carriage, money and time available to insure, for the boating industry on the line in question the conditions of navigability sought, etc.

2. The impossibility of establishing, at present time, fixed rules determining a priori the method which has to be preferred in any given case. While stating that the different methods used for improvement of river navigability have given satisfactory results and reached their purpose under special conditions, in which they have been applied, the congress finds, that it would be premature to try to establish at present time fixed rules determining a priori, the method to be preferred in any given case, inasmuch as the classification of rivers from the standpoint of their nature and of their navigation is yet to be accomplished.

3. Necessities for Studies.—If there be no general method for improving the navigability of rivers which is applicable to all rivers, and if the selection to be made be always governed by circumstances and remain a question of kind, each process can be perfected and made more suitable for rivers of a certain regimen. This makes it desirable:

"(a) That scientifically organized special studies be undertaken, by sundry nations, on rivers with different regimens in order to observe the degree of navigability which it is possible to attain by the applications of various methods of improvement and to determine the factors which govern the cost of the corresponding works;

"(b) That hydrotechnic laboratories intended for the study, on small scale models, of the life of rivers become of more and more extended use and that they be supplied with the means necessary to experiment with the various processes for improving the navigability of rivers and, in so far as possible, in connection with the studies and works carried out on the rivers themselves;

"(c) That the resolution of the Sixth Congress of Inland Navigation, voted at the Hague, in 1894, be carried into effect, this resolution calling for taking up, in connection with rivers having but one current, the study of a short, clear formulary, which shall be sufficiently complete and include the information necessary to define the characteristics of every river studied, from the double point of view of its regimen and its navigation;

"(d) That the improvement of the navigability of rivers having but one current, completed bp those of the laboratory experiments and of the formulary, be kept on the order of business of the next congress of navigation."

Canals of Heavy Traffic

THE second question discussed by the section on inland navigation was "Dimensions to be Assigned in Any Given Country to Canals of Heavy Traffic. Dimensions and Equipment of the Locks." Seven countries contributed to this question—Germany, through Herr Geheimer Oberbaurat W. Germelmann; Belgium, through P. Glaudot, engineer of the Ponts et Chaussees; the United States, through Col. H. F. Hodges, assistant chief engineer Isthmian canal commission; France, through J. Bourgongnon, chief engineer of the Ponts et Chaussees; Italy, through Edmond Sanjust di Teulada, senior inspector of the Genio Civite; Russia, through Nestor Pouzyreosky, engineer; Sweden, through Col. Frederick V. Hansen, president of the Royal Administration hydraulic motive power.

The views advanced by the various authors were summarized in a general

report by Alfred Noble, and his conclusions were:

(1) Standard dimensions applying to canals for heavy traffic, permitting interchange of traffic without transhipment, are desirable in any given country, and for adjacent countries where traffic is international to a great extent.

(2) Assuming suitable ports and facilities for handling freight in all cases as essential for economical transportation, the most suitable dimensions for canals will still depend upon many conditions, and particularly upon the general topography of the country, the nature of the principal items of freight to be transported and the extent of inter-communication practicable. Such items as grain, ores and coal, loaded quickly with machinery at a single point and unloaded with like devices at another, favor the use of large boats, while smaller ones may be better adapted for general merchandise.

(3) Where extensive and well coordinated canal systems already exist it may be inadvisable to change, even if larger dimensions would be better adapted to the traffic.

(4) These various conditions have led to the adoption for canals in Germany and Italy of dimensions suitable for boats carrying about 600 tons and to the retention in France of dimensions suitable for boats carrying about 300 tons, except in some special cases; in other countries still larger dimensions have been adopted in part.

(5) It is not practicable, however, in every country, to establish standard dimensions. The traffic in certain districts may be so different in character and volume from that in other districts as to require special accommodation. Where interchange of traffic is impracticable uniformity in canal dimensions is of less importance.

(6) The question whether canals should be free from tolls, or what proportion of the general costs of furnishing and maintaining the waterway shall be borne by the state is governed by the policy of the state.

(7) The organization of responsible transportation companies for canals which form links in trade routes, under suitable control by the state, should be encouraged.

Power and Large Boats

(8) Movement of boats by power is desirable in canals with heavy traffic, and is necessary if the boats are large. Where boats are towed in trains by tugs or from the tow-path by electric tractors, the organization of monopolies for haulage, operating under state control, would be advantageous.

(9) Increased traffic capacity of the locks of canal systems can be obtained advantageously by adapting them for locking two or more boats at one time.

(10) The dimensions to be given locks of short canals flanking rapids in rivers will depend on the widely varying character of the traffic, the water supply usually being ample. Where the prevailing traffic is in barges of moderate size, moving in large fleets, as on the Ohio river, it is desirable to have dimensions sufficient to pass a considerable number of boats at one lockage. Each case must be studied by itself and no general rule can be laid down.

(11) For a heavy traffic the equipment of locks for operation by power is desirable. The equipment should be as simple as compatible with effective and safe operation.

(12) In certain cases, as where the level above the lock is connected with a large body of water, or where the unrestricted flow from the upper level would be disastrous to the canal works or to adjacent property, means should be provided for quickly stopping the flow.

Discussion upon Mr. Noble's conclusion was participated in quite freely by Charles Valentine W. Germelmann, J. Bourgongon, M. Engels, O. Flamm, J. Van der Linden, M. M. Merczyng and M. Vandervin. M. Germelen felt that the most suitable dimensions for canals were for 600-ton boats, arguing that after experiments in boat traction it has been found that the minimum cost of transportation corresponds to a cross section of 75 square meters, the speed of five kilometers per hour being the most advantageous. The cost of transportation is considerably higher when the speed increases. Mr. Engels stated that the towing by tugs or from the banks produces the same results as to deterioration of canal banks. He said that deterioration depends exclusively upon the speed and form of the boats. Mr. Flamm as a ship builder discussed the action of the screw upon the canal bed and thought that in constructing new canals ship builders should be consulted. Mr. Van der Linden disagreed with M. Germelen regarding speed, believing that it should exceed five kilometers even when the banks need protection. M. Vandervin stated that the most essential point of all is to meet railroad competition and that large boats are absolutely necessary.

A committee was thereupon appointed to draw up a definite set of conclusions, which it did, after deliberation, as follows:

1. Standard dimensions for interconnecting canals, permitting interchange of traffic without trans-shipment are desirable.

2. Practical harbor and trans-shipment facilities and the rapid circulation of the means of transport are as important for the economy of transportation as fixed dimensions of canals and ships.

3. The waterway and its boats should receive progressively the improvement needed in order to continue to serve the traffic which it develops.

4. It is desirable to develop the traffic on the canals by trains of boats, towed by tugs and single self-propelling boats. If the traffic is very important, special attention is to be paid to the navigation.

5. For important traffic, it is desirable to provide the locks with mechanical appliances.

Special attention is to be paid to facilitate the entrance and the exit of boats.

Intermediate and Terminal Ports

THE third question considered by the Section on Inland Navigation was "Intermediate and Terminal Ports, Best Methods for Combining, Facilitating and Harmonizing the Transfer of Freight Between the Waterway and the Railway". The contributors to this subject were: Herr Stadtbaudirektor, Eisenlohr, Strassburg, Germany; M. P. Mallet, Paris, France; M. Tsionglinsky, St. Petersburg, Russia; Calvin Tompkins, New York; Chas. W. Staniford, New York; S. Willett Hoag Jr., New York.

The condensation and summary of the papers was made by Prof. Emory R. Johnson, University of Pennsylvania, Philadelphia, who reached the following conclusions:

(1) The problem of combining, facilitating and harmonizing the transfer of freight between waterways and railways is partly administrative or governmental and partly technical or mechanical. The methods to be followed in dealing with

questions of administration must depend upon whether the railroads are owned and operated by the government or by corporations.

In countries having state railroads, the connection and co-ordination of railroads and waterways at ports can be readily accomplished by the co-operation of local and state governments. The necessity for such co-operation is generally recognized; and the requisite distribution between the municipality and the state of financial and administrative burdens is ordinarily made without serious difficulty.

Co-Ordination of Railways and Waterways

The co-ordination of private railroads with public waterways being generally opposed by the railroad companies, must be, and ought to be, secured by the effective regulation of railroad services by national, state and local governments. The legislative and administrative requirements of the several political authorities should so supplement each other as to make a unified transportation system of the railroads and waterways in each country.

(2) Whether terminal and intermediate ports are developed by private interests or by the municipalities, it is essential that each port should be systematically organized for the accommodation of the traffic and the industries to be served. In some instances, this has been brought about by public regulation of ports owned and developed solely by private capital; but experience conclusively shows the need of supplementing public regulation of privately-developed terminals with the municipal ownership and operation of wharves, docks, warehouses, and other harbor facilities for the general use of the public. The number and variety of wharves and other facilities that should be maintained by the state or municipality at any particular port will depend upon the local requirements of the port. Exclusive private ownership of water terminals is indefensible.

(3) The actual legislative and administrative measure to be taken to co-ordinate railroads and waterways, to unify and systematize port facilities and to provide an efficient harbor administration must vary with different countries.

In the United States and countries having similar political organization it is necessary.

(a) That the federal government, which has authority over interstate commerce and carriers, should require railroad companies, engaged in interstate commerce,

(1) To make physical connections with waterways;

(2) To exchange traffic with the waterways;

(3) To issue through bills of lading and quote through rates over combined rail and water routes, and

(4) To secure to shippers the option of dispatching freight by an all-rail or by a rail-and-water line, when a choice of routes is possible.

(b) That the several state governments should take similar action concerning interstate commerce and railroads, and

(c) That each state should create in connection with the city government of each port, a harbor department or board, and should authorize the municipality, acting through this department or board, to take such measures as may be necessary to unify and systematize the physical layout of the water terminal, to construct and operate such public quays, wharves, docks, warehouses and other harbor facilities, as may be needed, and, generally, to regulate and develop the port.

Co-operation of State and City

(4) In countries that do not have a federal government, the state and local governments should co-operate (each country according to methods that have been found by experience to be wise and effective) to co-ordinate railroads and waterways, to systematize and develop the ports, and to insure their use by the general public without unnecessary restriction or unfair discrimination.

(5) The physical layout of intermediate and terminal ports and the mechanical appliances best adapted to the handling of traffic must be determined for each port separately and in accordance with its special requirements. Local city and state engineers must apply to the solution of local problems, and adapt to local conditions, the principles of port organization and operation that have been found effective at other ports and in other countries.

Mr. Harding described terminal facilities and technical and mechanical machinery, and methods for handling traffic at river ports and transferring the same from harbor to boat or steamer, and vice versa. He referred to warehouse facilities and co-operation that is possible between railways and waterway interests.

Thomas Wilkinson declared that railway monopoly had, in the past, interfered with expansion in waterway commerce and traffic, and that the same was controlled to the extent of 90 per cent in the United States by the railroad companies, and that the "Mediterranean of the United States", meaning by that expression the Great Lakes, are almost absolutely controlled by railroad interests, his remarks doubtless having reference to package freight.

J. F. Coleman, of New Orleans, described, at length, the character of the traffic handled at the important river port of New Orleans and the methods employed in doing it, and suggested that mechanical devices for such operations requiring heavy machinery is a question that is to be solved, and that it is a matter of placing cars closely to the dock. He held that it is impossible for mutual co-operation to be brought about between the railroad interests and the waterway interests of the country.

Prof. Clapp's Interesting Observations

Prof. Edwin J. Clapp, of the New York University, in summing up an elaborate argument, declared that the difference between rail and water rates is governed by the carrying of bulky goods, which can be carried at a low price; and a higher class of traffic that required rapid transportation; but he believed that in this country waterways could carry valuable goods as well as bulky goods that are not perishable, with proper terminals, transfer and warehouse facilities. He gave examples of the transportation of beer by the railways from internal points in Europe to river ports thence to be borne to the sea for transportation to the United States, to illustrate the possibility of co-operation between railroads and internal steamboat transportation, and what he said on this subject was approved by the Germans with many sagacious wags of the head.

Prof. Johnson agreed in part, but not entirely, with Mr. Wilkinson concerning the control of waterways by the railroads of this country, and referred to several instances in which railroads showed an anxiety to secure business by waterway connections, especially where the higher officials of railroads were favorably inclined to waterway interests, noting the Pennsylvania railroad and the Lehigh Valley railroad.

Col. Lansing H. Beach, of the Corps of Engineers of the United States Army, expressed the opinion that, after thorough study of the subject, in his capacity as an engineer of the United States, after having gone over the ground, that the rivers in this country are at a disadvantage as compared with the Elbe, and the Rhine, and the Danube, which are favored with a uniform flow of water the year around, and a fixed habitation, while in the United States many of the rivers are subject to floods in one season and drought in another, and a most provoking habit of changing the beds altogether, leaving the towns stranded, as it were. This makes con-

ditions for waterway transportation unsatisfactory and puts it on a different basis from that which is known to be the condition of many of the rivers in Europe.

Upon suggestion of Prof. Johnson, a committee of ten was appointed to formulate conclusions, which were finally submitted as follows:

(1) The problem of combining, facilitating and harmonizing the transfer of freight between waterways and railways is partly administrative or governmental and partly technical or mechanical.

The co-operation of private railroads with waterways should be secured by the effective regulation of railroad services by national, state and local governments. The legislative and administrative requirements of the several public authorities should so supplement each other as to make a unified transportation system of the railroads and waterways in each country.

(2) It is estimated that each port should be systematically organized for the accommodation of the traffic and the industries to be served. Experience conclusively shows the need of supplementing the use of privately developed terminals by the public ownership or control of the operation of wharves, docks, warehouses, and other harbor facilities for handling freights for public use. Exclusive private ownership of water terminals is indefensible.

(3) The legislative and administrative measure to be taken to co-ordinate railroads and waterways, to unify and systematize port facilities and to provide an efficient harbor administration must vary with different countries.

(4) The layout of intermediate and terminal ports and the mechanical appliances best adapted to the handling of traffic must be determined for each port separately and in accordance with its special requirements. Local city and state engineers must apply to the solution of local problems, and adapt to local conditions, the principles of port organization and operation that have been found effective at other ports and in other countries.

Reinforced Concrete in Hydraulics

THE first section on Monday, May 27, considered the subject "Application of Reinforced Concrete to Hydraulic Works", upon which five papers were submitted as follows: M. Jacquinot, Chaumont, France; R. W. Vawdrey, Parkhill road, Sidcup, England; M. Mederico Perilli, Ravenna, Italy; R. L. Humphrey, president National Association of Cement Users; and one by the Hungarian State Water Survey.

These papers were condensed by Maj. John Stephen Sewall, who submitted to the congress the following conclusion:

Reinforced concrete combines the structural qualities of steel and timber with the durability of good masonry. It is subject to no form of deterioration which can not be avoided by reasonable precautions. It is free from many of the limitations surrounding the use of masonry in mass; because of the greater latitude it affords in the design and execution of structures, it often yields the best and most economical solution, and in some cases the only practicable solution, of the most difficult problems.

When properly designed and executed it is, therefore, among the most valuable if not the most valuable material now available for use in connection with hydraulic works of all kinds.

The conclusions of the general reporter in this case created a great deal of discussion. Mr. Schultzer spoke of the works carried out in Germany. He did not want it understood that Germany was paying little attention to reinforced concrete. In fact, it is paying a great deal of attention to it. The action of sea water upon concrete, however, has not yet been determined, though the speaker believed that it exhibited good resistance to frost.

R. L. Humphrey was particularly anxious to have the section go on record on the subject. He said that there are enough examples of reinforced concrete in salt and fresh waters to insure that it can be permanently used in sea water, and he believed that the congress should so recommend.

Joseph Ripley, of the state barge canal, however, thought that the conclusions of the general reporter were too sweeping. He added that we did not know all that there is to be known about mass concrete, to say nothing of reinforced concrete. The human factor is one of the greatest elements in the making of successful concrete and the subject is by no means a solved one.

Colonel H. A. Yorke, the only engineering representative of Great Britain at the session, said that he could not remain silent as long as the general reporter had seen fit to conclude that concrete was the most valuable material now available for use in connection with hydraulic works of all kinds. He added that there is no way of determining the adhesion between steel and concrete before the work is completed and that then it was too late.

Mr. Ripley urged that the session reach no dogmatic conclusion on the subject and Mr. Smrcek regarded it as dangerous to endeavor to formulate any conclusions because they might be influenced by some commercial design.

J. A. Ockerson moved that the section refrain from reporting any conclusion on the subject but to put it forward as a question for the next congress. This was accordingly done.

Protection of Banks

THE first section on inland navigation then considered the following subject: "Report on the works undertaken and measures adopted or proposed for the improvement and development of lines of inland navigation as well as for the protection of the banks of navigable highways."

Ten reports were submitted by Herr Regierungs and Baurat Bergius, Oderberg; E. J. Marote, Antwerp; Maj. Wm. D. Connor, corps of engineers, United States army; L. Dusuzeau, Compeigne; J. A. Saner, Northwich, England; Antonio Castiglone, Milan; A. R. Van Loon, Bois-le-Duc, E. A. Wodarski, St. Petersburg; Emile de Hoerschelmann, Tsarskoie-Gelo.

The compilation was made by Henry C. Newcomer who, however, did not attempt to formulate any conclusion.

Mr. de Hoerschelman gave an interesting and detailed account of the complementary studies on the canalization of the Dnieper near Iekaterinoslav. No conclusion was reached on this subject.

THE DELEGATES FROM THE LATIN COUNTRIES, WITH CONGRESSMAN J. HAMPTON MOORE AND MEMBERS OF THE RECEPTION COMMITTEE

Section on Ocean Navigation

Maximum Dimensions of Sea Going Vessels, Mechanical Equipment of Ports, Repairing Vessels and Types of Dredges Considered

ONE of the most important questions considered by the section on ocean navigation, presided over by Elmer L. Corthell, was "Dimensions to be Given to Maritime Canals and Probable Dimensions of Sea Going Vessels of the Future." Upon this subject six papers were submitted as follows: G. De Thierry, Berlin, Germany; H. Vander Lin, Antwerp, Belgium; E. L. Corthell, New York; J. Foster King, Glasgow, Scotland; C. Leemans, Amsterdam, Holland; E. I. Zamjatin, St. Petersburg, Russia.

The general report was prepared by C. E. Grunsky of San Francisco, who submitted the following conclusions for the consideration of the section:

I. It is desirable that a limit be set to the draught of sea-going vessels.

II. Government aid should not be extended to the building or operation of sea-going vessels whose draught exceeds 9.5 meters (32.2 feet).

III. There should be an international agreement fixing the maximum dimensions of sea-going vessels built or operated under government subvention, and there are tentatively suggested the following:

Length over all, 900 ft. (275 meters).

Breadth, 105 ft. (32 meters).

Draught, 32.2 ft. (9.5 meters).

IV. Any maritime canal which has locks with a usable length of 1,000 ft. (305 meters), a width of 110 ft. (33.6 meters) and a depth of water on the sill of 35 ft. (10.7 meters) will fulfill every reasonable requirement of commerce.

V. In a maritime canal a wet section five times as large as the immersed portion of the largest ship which is to use the canal is desirable, as also a depth of one meter under the keel; but these values are functions of the speed at which the canal is to be navigated and therefore to some extent also of the volume of commerce, and are to be determined by local conditions.

The conclusions of the general reporter evoked the liveliest interest, Mr. Corthell himself opening the discussion. Mr. Corthell pointed out that it would be extremely dangerous to adopt the conclusions as made by Mr. Grunsky because England would undoubtedly resent them. In fact, England had no representative at the second section, not yet having subscribed to the section on ocean navigation. He felt that the attitude of England towards the congress would be extremely hostile if Mr. Grunsky's conclusions were endorsed.

J. Foster King, chief surveyor for the British Corporation, Glasgow, Scotland, attended the meeting, not as a representative of Great Britain but as a delegate from the Institute of Naval Architecture.

"I feel, said he, "that if this congress adopts this resolution which contemplates limiting ships to 900 ft. in length it will do an inadvisable and injudicious thing, to say the least. You cannot stop the progress of nations by resolutions and you do not want to discredit your great organization by putting yourself on record as desiring to stop the growth of ships at this arbitrary point."

Great Britain has studiously declined to have anything to do with this feature of the congress, believing that any imposition of limitations on the size of ships would be in restraint of British trade.

It was the declaration of Mr. Corthell that the Titanic disaster would have been even more appalling in the proportion of lives lost had the ship been smaller.

"Many people think," said he, "that the sinking of the Titanic and the terrible loss of life resulted from the immense size of the ship, when as a matter of fact the majority of naval

architects are agreed that had the ship been smaller, the loss of lives would have been greater in proportion to the number of persons aboard."

Mr. Corthell read a number of letters from naval architects, one from Lewis Nixon, who declared that the safety of the ship increases with its size.

"I am opposed to the resolution limiting the size of ships," said C. Leemans, Amsterdam. "So long as it is economic to move freight in large quantities, the right to build large ships for the carriage of this freight must be observed. The function of our congress is to promote and not to restrain navigation."

G. de Thierry of Berlin also differed with Mr. Grunsky. "Some day," said he, "there will come a time when economical reasons will set a limit to the size of ships, but I don't believe that it will be soon. I think our efforts will end in failure if an attempt to regulate the size of vessels is made by this congress. If economical reasons call for the increase in size of ships, then any action hostile to this growth taken by the congress, will be absolutely worthless."

The speaker moved to put the limit of the size of vessels out of consideration at the present session of the congresss, taking up only the question of the size of canals, but this motion was replaced by one from Mr. Corthell who moved that the first four paragraphs of the conclusions set down by Mr. Grunsky be stricken out and only the fifth one relating to the size of canals be accepted as the sentiment of the congress. This was unanimously carried.

Docking and Repairing Vessels

THE opening question considered at the first session of the Second Section, presided over by Elmer L. Corthell, was "Means for Docking and Repairing Vessels", upon which eight papers were submitted. The first paper was the composite work of H. Monch, of Berlin; Ph V. Klitzing, of Kiel; P. Hedde, of Berlin, and the others were contributed by L. Descans, of Antwerp; James Donald, of Quincy, Mass.; A. Guiffart, of Lorient; Edward Bok, of Newcastle-on-Tyne; Edward Egan, of Budapest; Luizi Luiggi, of Rome, and C. Nobel, Dutch Indies.

These papers were condensed by Rear Admiral Mordecai T. Endicott, retired, who summed up the conclusions as follows:

There can be no doubt that the decision as to the type of dock to be used in any locality must be made after a careful consideration of the conditions existing there; there may be some feature in the situation which would preclude the establishment or use of one or the other type; there may be conditions affecting the cost to so great an extent as to settle the matter upon this basis alone, but there is in the minds of most engineers and naval experts a definite opinion as to the value and desirability of the two types where practicable to establish them, and the writer is of the opinion that this is the decision, if any, to which the congress should give expression. Which type, when practicable to be installed, best meets the demands of commerce for the safe and economical docking and repairs of sea-going vessels? It is believed that the congress could reach a decision upon this point, and it is such a decision as would be of value to the world, and for which, perhaps, it has some reason to look.

The preponderance of opinion, in the reports reviewed, is in favor of the graving dock. A study of all these reports both pro and con serves to confirm the opinion of the general reporter, formed after an observation and experience extending over a long term of years, that graving docks supply in the greatest degree the conditions of safety, convenience and economy for the docking and repairs of sea-going vessels.

After considerable discussion, the conclusions of Rear Admiral Endicott were indorsed by the Session.

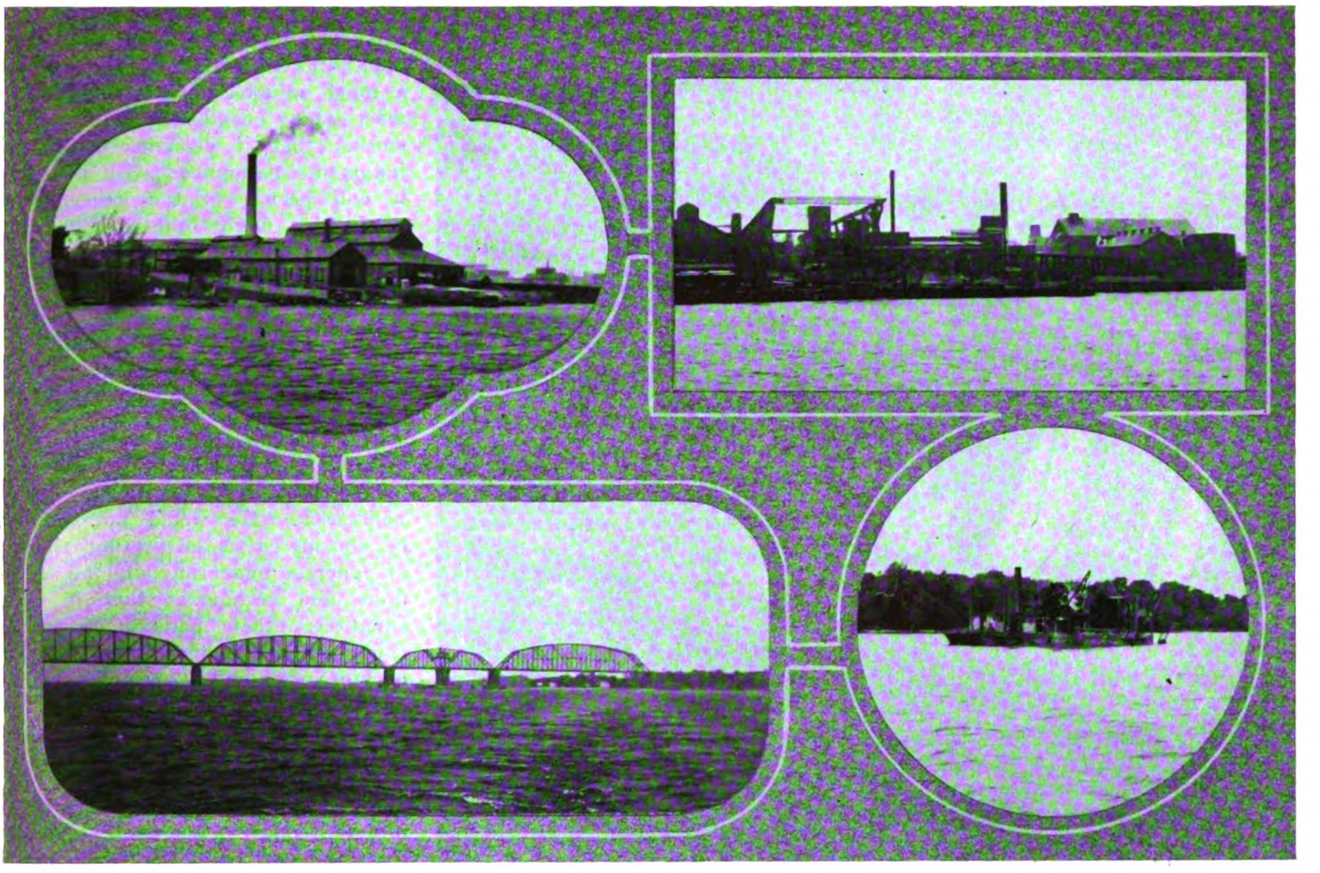
Mechanical Equipment of Ports

THE third question taken up by the Section on Ocean Navigation was upon "The Mechanical Equipment of Ports", to which there were seven contributors, as follows: Herr Budendey, Hamburg; Frank W. Hodgdon, Boston; M. Barrillon, Bordeaux; I. C. Barling, Middlesbrough; Wouter Cool, Rotterdam; M. Spalving, Odessa, and M. Hermann, Tunis.

The general report was made by John A. Bensel, state engineer of New York, who, however, formed no conclusions. In Europe, ships are usually moored to quays or dock walls, on which are located sheds or warehouses with railroad tracks on both sides. Quay cranes have been in use for nearly four centuries, operated by man power and by steam, hydraulic and electric motors. Hydraulic cranes are still used in old installations and in England are preferred to electric cranes, but in most places new installations are electrically operated wherever current can be obtained from a central power station. In the United States and Canada the mechanical equipment for handling general cargo has not reached the development that it has in Europe, general cargo being handled usually by the ship's winches. The quay cranes in use in Europe are almost unknown, but it should be explained that in Europe freight cars are of the unroofed, or what is called in the United States the "gondola" type, whereas in the United States general merchandise is usually carried in box cars, which cannot be loaded directly by means of a crane. Grain is handled by special installations and machinery and the general principles do not vary much in various parts of the world. Coal handling machinery may be divided into two classes —that for ships' bunker coal and that for cargo coal. The machinery for handling cargo coal has its largest development in the United States, while machinery for handling ore and minerals has reached an extreme development on the Great Lakes.

The discussion was led by Mr. Harding, of New York, who declared that harbors should be equipped with sheds, cranes and handling equipment so installed as to serve every cubic foot of the terminal and to reduce hand labor to a minimum. The terminal should not be simply a four-wall building, but should consist of a pier, bulkhead and shed, driveway, railway and warehouse, all connected for the rapid handling of cargoes, as it has been proved that the cost of terminals is more than the cost of transportation. He referred especially to the Bush terminals at New York.

John Kennedy, the blind engineer of Montreal, invited the delegates to inspect the port of Montreal, the admirable facilities of which, the chairman said in introducing him, are almost entirely due to the efforts of the sightless expert.



SCENES ALONG THE DELAWARE, SHOWING THE PLANTS OF R. D. WOOD & CO., THE AMERICAN PIPE & FOUNDRY CO., THE NEW PENNSYLVANIA RAILWAY BRIDGE AND A DREDGE AT WORK

"The harbor is unique," said Mr. Kennedy, "as belonging entirely to the government of Canada and being administered by the board of commissioners entirely in the public interest. There are no private wharves or other port equipment, but all is publicly owned. The railway tracks upon the wharves are also part of the equipment and all railway companies have access through those tracks to any ship by merely handing over their cards to the commissioners' railway service, by which cars are deposited alongside the steamship sheds or alongside the ship itself, if so desired. The steamship sheds in the newer wharves are two stories in height, the lower floor being made level with the car floors and, therefore, convenient for the handling of freight. Both floors are accessible to drays, the lower floor by direct access and the upper floor by means of large platform elevators, which hoist or lower the drays between the lower and the upper levels. The trade of Montreal comprises practically everything usually handled in seaports, that is exports and imports, through traffic and local traffic, export of grain and large passenger traffic. The harbor is, therefore, equipped for all sorts of service and will present points of interest to all who care to visit it by taking the Canadian trip."

George E. Titcombe, of New York, gave some interesting figures, showing how the United States ports lead European ports in coal shipments, Amboy, N. J., for instance, handling three times that of Rotterdam, while the most highly developed coal handling plant in the world is to be found at Duluth. Incidentally he announced that Philadelphia is to have the largest car yet made for handling coal. The car is being constructed by the Pennsylvania railroad for service at Girard Point and will have capacity for 100 tons of coal, which will be dumped into the hold of a vessel at one time.

No conclusion was reached on this subject, but was submitted as a question to be discussed at the next congress in the following language:

"Mechanical transferring of miscellaneous cargoes from the vessel's hold or from the vessel's deck or from the pier's side to all areas embraced within the terminal limits."

Reinforced Concrete in Sea Water

THE second section also considered the subject of reinforced concrete under the following headings:

"Report on the Most Recent Works Constructed at the More Important Seaports and Especially Those Relating to Breakwaters"; "Applications of Reinforced Concrete; Means for Insuring Its Preservation".

The contributors to this subject were the general government of Algiers; H. Monch of Berlin; C. Bech, engineer in the Royal Danish water works department of Helsingor; N. C. Monberg, civil engineer of Copenhagen; H. C. V. Moller, chief engineer of Copenhagen; J. F. Hasskarl, director department of docks, wharves and ferries, Philadelphia; J. Boisin, Boulogne-Sir-Mer; A. E. Carey, member of the Institute of Civil Engineers, London; I. Inglese, Genoa; L. Luiggi, Rome; V. de Blocq Van Kuffeler, Hoorn, Netherlands; Albert Lundberg and Wollmar Fellenius, Sweden.

These papers were condensed by Lieut. Col. Edward Burr, corps of engineers. He made a most excellent condensation and was most guarded in his conclusions, saying:

"Your general reporter is of the opinion that in good, sound concrete,

1—Japan's Delegates in Front of State House, Trenton. 2—W. H. Kleiber, St. Petersburg; M. Merczyng, St. Petersburg; L. de Rummel, Revel, Russia; A. V Ivanorsky, Russia. 3—Mayor Fred Donnelly, of Trenton, in Center. 4—P. Rueff, Antwerp. 5—D. J. Lynn and Mahlin R. Magarum. 6—The German Delegation. 7—Captain E. Botez, Soulina, Roumania

plain or reinforced, the engineer has a most valuable device adaptable to meet many conditions in maritime works; that if designed with good judgment and applied with discretion it will permit of the execution of works that might otherwise be financially or physically impracticable and will ordinarily permit of economy in permanent works; that it is reasonably permanent in sea water if applied with all the precautions that experience to the present time has suggested and that further experience may provide additional means for increasing its reliability; but that no precaution should be omitted in its application. He would not, however, be considered as advocating the use of concrete under any and all conditions and recognizes that in some situations other materials, alone or combined with concrete, give better or more economical or more permanent results.

Experience Not Sufficient

"It is evident from the reports before the congress and more especially from the current literature upon this subject that experience with reinforced concrete in sea water has not to the present time covered a period sufficiently long to permit of laying down conclusions in detail as to the best methods to be followed for its preservation. With longer experience such conclusions might be so formulated as to meet the approval of the congress and some of them might be put forward at this time. It would seem, however, to be wise merely to refer to the experience heretofore gained in the matter of such details, as contained in the reports before the congress or as found elsewhere, and to defer action by the congress on such matters until conclusions thereon may be supported by such further experience as will enable the congress to adopt them with greater assurance as to their sufficiency.

"Only the following general conclusions are therefore submitted for the action of the congress:—

"1. Further experience tends to confirm the conclusion of the congress of 1908 that the earlier results of the application of reinforced concrete to hydraulic and maritime works are encouraging and to indicate that reinforced concrete may be expected to be reasonably permanent in sea water if the precautions necessary to secure that end are intelligently and unremittingly exercised in accordance with the best experience in such works.

"In view of the comparative novelty of this type of construction, its in-

creasingly wide application and the rapidly growing experience in its use, this subject should again be made a question of consideration at the next congress."

The discussion upon the subject was most spirited.

J. Voisin stated that the construction with reinforced concrete in Algiers has been satisfactory for the past fifteen years. Its use in salt water, however, must be made with precaution and he suggested that the question be continued as one to be dealt with at the next congress.

Mr. Inglese reported that concrete was being used in the construction of breakwaters in Italy. After further discussion it was decided to put the subject on the program for the next congress.

Safety of Navigation

SIX papers were presented to the second section on ocean navigation and the general subject of safety of navigation. These papers were summarized by G. R. Putnam, commissioner of lighthouses, Washington, D. C.

The report of G. De Joly, chief engineer of central service of lighthouses and beacons, of France, deals with the illumination of the coasts of that country by gas-lighted buoys and by light vessels. Buoys lighted by electricity or by mineral oil have not been used but oil gas buoys have been extensively employed. In order to increase the luminous intensity all of the oil lighted buoys have upright incandescent mantles. This form of mantle, made of artificial silk, has been found preferable in the French service. Acetylene gas has not been adopted for buoys in France but it is used for some beacons.

A report on lighted buoys of the Prussian coast was furnished by Herr Regierungsbaumeister Braun, of Berlin. For these buoys oil gas and more recently Blau gas, have been used, the latter being preferred. A few buoys have been lighted electrically or with petroleum. Suspended gas mantles are preferred.

The paper of D. A. Stevenson, of Edinburg, Scotland, states that the lighted buoy is the greatest aid to navigation produced during recent years. Some waterways, as for instance the Clyde, are now lighted like a street at night.

Lighting Service of Holland

Mr. Van Braam van Vloten, engineer to the lighting service of Holland, furnished a paper on the lighting of that coast. A general description is given of the organization of the service of lighting and buoying the coast of Holland. In 1905 a plan was approved for the improvement of the lighting of the Dutch coast which had previously been mainly by fixed or flash lights using petroleum wick lamps. Four of the most important coast lights have been reconstructed with electric flash lights and eight other lighthouses have been fitted with incandescent oil vapor lights.

A paper on the automatic lighting of light houses, light ships and light buoys in Sweden was presented by Mr. Gronvall, chief engineer in the light house service of Sweden. On account of the intricate coast the Swedish light house department has endeavored to develop a system for automatic lighting at stations where fog signals or a very strong light are not needed. Pintsch buoys and calcium carbide buoys have been tried. Difficulties which were found were obviated by the use of the French invention of dissolved acetylene gas. An apparatus for giving intermediate lights was invented by Engineer Dalen. The advantage of this arrangement is the light characteristic and the saving in gas. Ordinarily one-tenth of the gas is consumed that would be required for a continuous light.

A paper by Col. Millis, United States engineer, was devoted to the great lakes. He gave a general description of lake traffic and class of vessels engaged in it, together with the general character of the lakes and connecting waterways, and the various aids to navigation established by the government. Colonel Millis advanced several suggestions tending to reduce the risk of accidents. Colonel Millis stated that during the past ten years accidents and damages to vessels on the lakes numbered 3,031, amounting altogether to over $15,000,000.

There was quite a general discussion on the subject but no conclusions reached.

Bridges and Ferry Bridges

REPORTS on bridges and ferry bridges and tunnels under waterways used for ocean navigation were made by Baurat Wendemuth, of Hamburg, F. Zanen and L. Descans, Gustav Lindenthal, A. Forte, A. Rodjestvenski and E. J. Nilsson, and were summarized by Prof. William H. Burr, of Columbia University, from which he drew the following conclusions:

"1. Where maritime channels carry ocean navigation of large amount or of such density as is now found in a few of the largest ports of the United States and Europe, means of crossing them must be employed which will not obstruct such navigation to any sensible extent.

"2. In maritime channels where ocean navigation is of considerable volume or density, but not so dense as in the greatest ports of Europe and America the plans for crossing these channels must be such as will give preference of right of way to the ocean navigation, in other words, the service to the land traffic must be subordinated to the requirements of the ocean navigation.

"3. Plans for the crossing of maritime channels which involve considerable obstruction to navigation can only be recommended where the ocean navigation is light or of small amount concurrently with a heavy land traffic of corresponding importance.

"4. Channels for ocean navigation wider than about 2,000 ft. (600 m.) offer advantageous conditions for the use of ferries, including ferry boats for passenger and vehicle traffic and car floats either self-propelled or propelled by tugs.

"5. Channels about 2,000 ft. (600 m.) or more in width will preferably be crossed by tunnels when the ocean navigation becomes so dense as to be seriously inconvenienced or obstructed by the passage of ferry boats, or when the volume or rapidity of service required by passenger and vehicle traffic, or freight traffic, is demanded beyond that which can be furnished by ferry.

"6. Movable bridges may be employed for the crossing of channels for ocean navigation when the width does not exceed about 500 ft. (150

m.) and if the ocean navigation is not dense enough to prevent the closing of such bridges sufficiently to accommodate the land traffic.

"7. Transporter bridges may be used advantageously up to any length of span permissible for a stiffened suspension bridge when the channel carries a comparatively dense ocean traffic, if the land traffic is not of too great volume.

"8. Tunnels may be used advantageously for heavy land traffic under channels carrying ocean navigation so dense as to preclude the use of movable spans and where high permanent bridges are not permissible on the score of economy or for other reasons, or where transporter bridges are not permissible for carrying railway or other traffic.

"9. The use of lifts or elevators for passengers and vehicle traffic in connection with tunnels and high permanent bridges is recommended.

"10. High permanent bridges are recommended where the maritime channel is flanked by rapidly rising ground, so as to eliminate costly approaches, or where a great depth of water precludes a tunnel.

"11. The selection of a suitable plan for crossing a maritime channel so located and conditioned as to make the controlling elements not so well defined as in the cases covered by the preceding recommendations must be made after a careful examination of all the circumstances affecting the problem, including complete comparative estimates of costs covering construction, land, maintenance, operation, etc."

High Powered Dredges

THE reports on high-powered dredges as a means of removing rock under water, eight in number, were contributed by Michael Koch, of the Royal Hungarian Navigation Board, in Orsova, Hungary; Mr. Vidal, engineer, Bordeaux, France; Ramon Hernandez, engineer, Oviedo, Spain; N. J. Sunblad, Trollhatten, Sweden, Giovanni Fossataro, Venezia; R. Blumcke, Mannheim, Germany; Sidney B. Williamson, Pacific division, Isthmian canal; and the Messrs. A. de Kanter and H. C. Wesseling, Rotterdam, Holland. The condensation of these reports was made by W. L. Saunders, of the Ingersoll-Rand Co., New York, who gave his conclusions as follows:

"The type or design of dredger that may be employed is governed by the surrounding conditions in which it works.

"Generally considered, where the scene of operation is open water and excavating light material such as mud or sand, suction dredgers with a drag suction, or elevator dredgers, may be employed to the greatest advantage.

"Where the situation is confined, as between and around docks and in narrow channels, the grab or clamshell and the dipper dredger are better adapted for the purpose.

"In classifying the types in accordance with their effectiveness in the different classes of material, it would appear that the Fruhling system has developed the greatest efficiency in excavating mud and fine sand. This efficiency is due to the design and action of the suction head which, it is stated, will under certain favorable conditions excavate a semi-fluid mass of a consistency from 80 to 90 per cent solid. It is stated that the average cost, all charges included, over a full season's work, has reached the low point of nine-tenths of 1 cent per cubic yard.

Application of Types

"In the clays, suction dredgers fitted with revolving cutter heads at the mouth of the suction pipe have proven most effective.

"In hard clays, the elevator and dipper dredgers give the best results.

"The very hard indurated clays, shales, soft rock formations and hard-pans, are excavated most economically by elevator dredgers. This refers to dredging without previous blasting.

"Rock that has been broken is most economically dredged by the elevator type or the dipper type of dredger. Where the rock is broken by breakers of the Lobnitz type and where the depth of each breaking is limited to 2 or 3 ft., the elevator dredger, owing to its ability to dredge closer to a given grade, is more effective. Where rock is drilled and blasted, the rock being broken in large pieces and the depth of the cut or broken masses of rock more than 3 ft., the dipper dredger will demonstrate superior economy. This does not apply to excavations in depths of 35 ft. or more, as the dipper dredgers, owing to their mechanical design, lose their effectiveness beyond certain depths.

"From a great amount of data available, it would appear that drilling and blasting by the American method is the most rapid and economical means of preparing the harder rocks for dredging where the depth of rock to be removed is greater than 2 ft. in depth. When the rock to be removed is less than 2 ft. in depth, the Lobnitz type of crusher attains greater economy as a means of breaking rock. This depth of 2 ft. may be increased in thinly stratified rock or in rock that shatters easily."

Mr. Perrier gave a description of the dredges of the Suez canal which are of various types owing to the nature of material through which the canal penetrates. The majority of the dredges are of the bucket type, but certain rock sections are broken up by the Lobnitz machines. Mr. Martinowsky suggested that the next congress discuss the question of the comparative economy of dredging by ladder dredges with internal combustion engines and with steam engines. No further conclusion was reached on this subject.

Large But Shallow Rivers

FOUR papers were submitted on the subject "Utilization of the Navigation of Large, But Shallow Rivers for Vessels and Motors". R. Blumcke, of Mannheim discussed a comparison of the relative economies of side wheel and a propeller-in-tunnel towboats. CoL C. McD. Townsend, corps of engineers, United States army, gave reasons for the decadence of traffic on the Mississippi river. F. Rayner, Nottingham, England, described the tunnel towboat as used in the Trent and H. Merczyng of St. Petersburg submitted a statement concerning motor boats on Russian rivers. These reports were condensed by Col. Lansing H. Beach, but as all the speakers took different topics no such thing as a general conclusion could obviously be reached.

THE GRAND BANQUET TO THE DELEGATES AT THE BELLEVUE-STRATFORD ON THE EVENING OF MAY 27

Entertaining the Delegates

The City of Philadelphia Was Lavish in Its Care of the Delegates —Trips to Points of Interest—Mayor Blankenburg a Rare Host

DURING their stay in Philadelphia the delegates were loyally entertained by the local committee. On Thursday, May 23, at the conclusion of the opening meeting of the sessions the delegates were taken in automobiles to the Commercial Museum to see the special navigation exhibition. This exhibition included models of the Panama canal, locks and dams, the New York state barge canal, as well as a model showing the comprehensive plans for the development of the port of Philadelphia. In the evening the delegates were taken to Keith's theater where arrangements had been made for a moving picture display of actual operations along the route of the Panama canal. This display was greatly appreciated by the delegates, as it was a revelation in the application of machinery in excavating, loading, transporting and unloading earth.

Sight Seeing Trips

Friday was given over to sightseeing altogether, the delegates having the option of making a trip along the Delaware river from Trenton to the League Island navy yard or of visiting the anthracite coal fields and the plant of the Bethlehem Steel Corporation.

More than 300 went to Trenton, where they were addressed by Governor Woodrow Wilson in the state house. It is doubtful if the delegates ever listened to an address that was briefer and yet more to the point. He declared that the country had well solved the problem of railroad transportation, but that it had not as yet built up an adequate system of waterways. He believed that the railways and waterways should supplement each other. Speaking in a slightly satirical vein, the governor stated that the United States was undoubtedly the most unselfish country in the world, because, after having practically abolished its own merchant marine it was now engaged in building a canal for the exclusive benefit of foreign ships. He insisted that there would have to be a change in the attitude of the nation towards its shipping, otherwise there would be no American ships to pass through the canal. He thought also that the meeting of the congress in the United States would serve to cement nations, pointing out that the United States is foreign to no country, but is rather a nation built up and enriched by all nations.

Cape May and Atlantic City

The delegates were received at Trenton by Mayor Fred ·Donnelly, who accompanied the party on its trip along the Delaware. The delegates were given an opportunity to visit every part of the plants at Cramp's, the New York Ship Building Co., and the League Island navy yard. At the latter place the battleship Connecticut happened to be in dry dock and was thoroughly explored by them.

At Bethlehem, the delegates were received personally by Charles M. Schwab, who conducted them through the entire plant and gave them a dinner at the conclusion of their inspection.

On Sunday, the party had the option of visiting either Cape May or Atlantic City. The delegates were about equally divided between the two excursions. The special train which conveyed the delegates from Philadelphia to Atlantic City consisted of all-steel cars and the trip of 60 miles was made in 43 minutes, said to be the fastest time ever made on the line. Upon reaching Atlantic City a special concert was given on the steel pier during the morning hours, followed by luncheon at the Marlborough-Blenheim. The afternoon was spent in sight-seeing, the party returning to the Marlborough-Blenheim in the evening for an elaborate dinner.

The Cape May party were taken about the harbor in launches and made an inspection of the breakwater now in course of construction at Cape May. The services of the life saving crew were drafted to embark the party upon the sidewheel steamer Queen Anne, as stages of water did not permit her coming alongside the dock. The trip of 96 miles along the Delaware to Philadelphia was a most enjoyable A buffet luncheon was served aboard the steamer and a stop made in the evening at Washington Park for a planked shad dinner.

The grand banquet of the congress was held in the ballroom of the Bellevue-Stratford on Monday evening, May 27, Mayor Rudolph Blankenburg, of Philadelphia, acting as toastmaster and a more agreeable one it would not be possible to find. The first speaker was M. Timonoff, acting president of the congress. He was followed by General W. H. Lixby, chief of engineers; M. Chargueraud, of Paris, vice president of the congress for France; Captain Matsumura, naval attache Japanese Embassy, Paris; John C. Bell, attorney general of Philadelphia, and Congressman J. Hampton Moore.

Visit to Washington and Pittsburgh

On Tuesday evening the foreign delegates left for Washington where they were received by President Taft. They then went to Harrisburg and were entertained by Governor Tener. Pittsburgh entertained them for two days, during which they visited the great steel plants of the district. The delegates returned to Philadelphia on June 2, and on June 3 left for Chicago via the Hudson river. June 4 and 5 were spent in New York City, and on June 6 a tour of the Hudson river was made on one of the steamers of the Hudson River Day Line, stopping at West Point. The party reached Buffalo on June 8 for a tour of the great lakes.

Merger of Canadian Lines

It is now certain that before the summer is over all of the Canadian passenger and freight lines will be merged into a single company. The stockholders of the Richelieu & Ontario Navigation Co. have just ratified the details of the merger which has been carried on by the directors during the past two years. The merger will give the Richelieu & Ontario Navigation Co. control of more than 70 steamers of all classes and according to an official statement issued will include the Northern Navigation Co., the Niagara Navigation Co., the Inland Lines, Ltd., the Turbinia Steamship Co., the Hamilton Steamboat Co., the Thousand Islands Steamboat Co., and the St. Lawrence River Navigation Co., with terminal properties in Quebec, Three Rivers, Scovel, Toronto, Hamilton, Sault Ste. Marie, Midland, Montreal, Fort William and other points along the Niagara and St. Lawrence rivers.

Steel Freight Steamship Evelyn

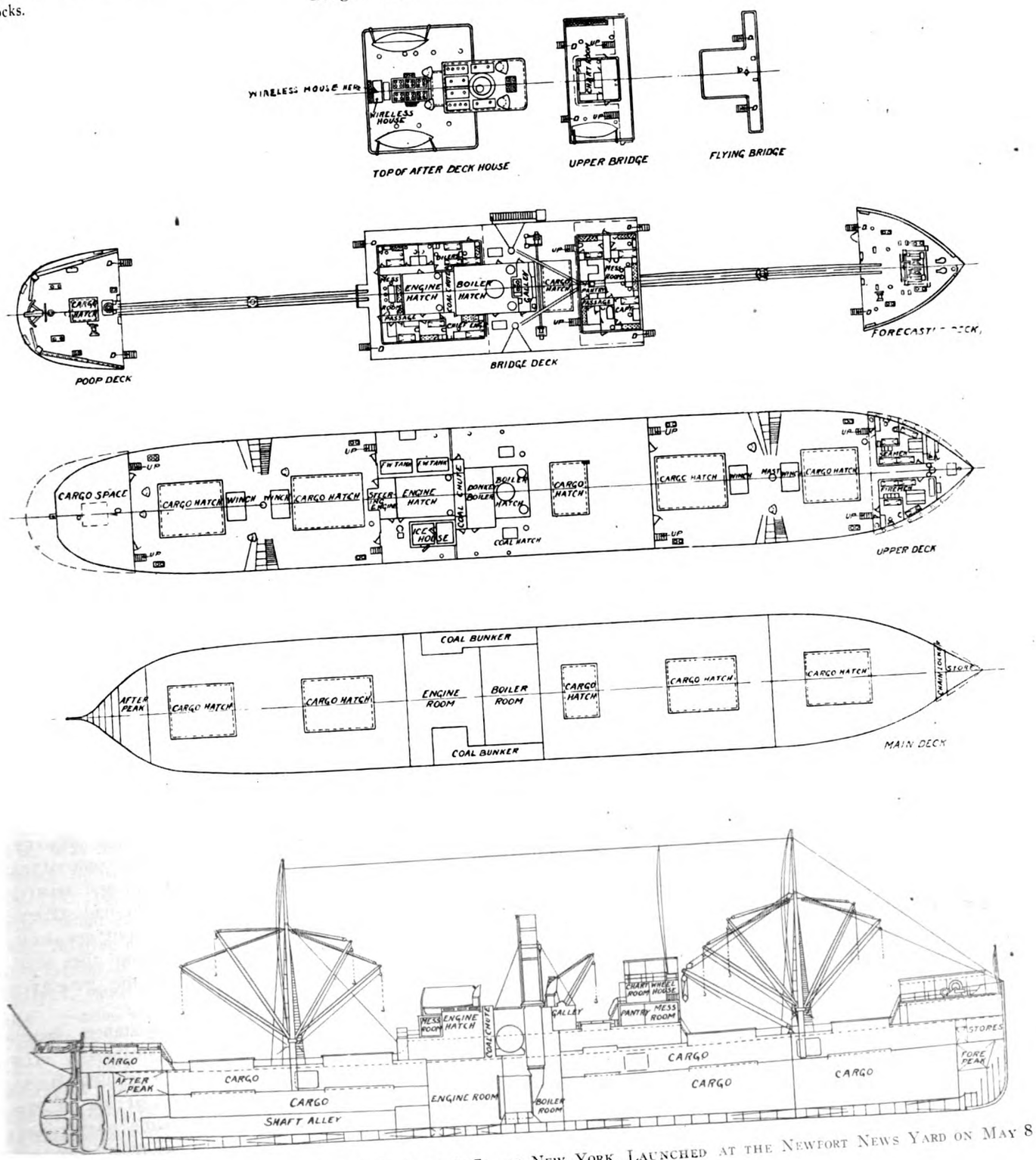
The latest addition to the fleet of the A. H. Bull Steamship Co., of New York, is the steel freight steamship Evelyn, which was launched by the Newport News Ship Building & Dry Dock Co. on May 8. This is the fourth vessel built at that ship yard for these owners, and a fifth vessel for the same owners is on the stocks.

The Evelyn differs from the Hilton, which was completed last July, by having an intermediate deck, cargo ports, a 25-ton boom and a wireless outfit. It is constructed to Lloyds highest class with longitudinal framing.

The general appearance of the vessel is shown by the illustration. The following particulars may be of interest:

Length over all	328 ft. 0 in.
Beam, molded	46 ft. 0 in.
Depth, molded	25 ft. 6 in.

The vessel is fitted with one triple-expansion engine, cylinders 22 in., 37 in. and 60 in. diameter by 42 in. stroke, two Scotch boilers 15 ft. diameter by 11 ft. 6 in. long, built for 180 lb. pressure, natural draft, and one donkey boiler, Scotch, 9 ft., 6 in. diameter by 9 ft., 4 in. long, built for the same pressure.



PLANS OF STEEL FREIGHT STEAMER FOR A. H. BULL & CO., OF NEW YORK, LAUNCHED AT THE NEWPORT NEWS YARD ON MAY 8

THE MARINE REVIEW

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June, 1912

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Launching Risks

Launching risks are always considerable from the physical standpoint and are quite enough for the shipbuilder to worry about. However, the firm of Cammell, Laird & Co. have had to worry about a legal risk as well in launching the steamship Highland Loch from their Tranmere yard on the Mersey. The case is one which will interest all shipbuilders.

On the day that the Highland Loch was to be launched, the ketch Francis was anchored in the Mersey, opposite the ship yard. She was duly warned by the ship builders to move from the position taken up. The anchor, however, had got foul of some moorings in the river and her captain refused to slip his anchor and have his vessel towed to a safe position by a tug sent out for that purpose. The result was that the launch took place and the Francis was struck and damaged. When the case was tried by the admiralty division, judgment was given in favor of the Francis. It was held that the captain of the Francis was at fault in not slipping his anchor when warned, but the court held that the launching was not justified while the Francis was in the danger zone and judgment was given based on the principles of common law under which the owners of the Highland Loch were held to be solely liable on the ground that although there was negligence on the part of the Francis, the damage could have been avoided by postponing the launch.

Having regard to the unsatisfactory character of the decision to the whole shipbuilding industry, the case was taken to the court of appeals which reversed the decision of the admiralty court on the ground that the judge had overlooked the fact that there was danger involved in the postponement of the launch, and that the shipbuilding company in ordering the launch to proceed had only in making a choice between two evils chosen what in its opinion was the lesser one and held the Francis entirely to blame.

This decision certainly is in accordance with common sense and in no way lays down any new dictum that a ship may be launched in common waters utterly regardless of the consequences to property owned by other users of the water. An appeal, however, was taken to the House of Lords, which promptly dealt with the case as one of fact and not of law, and thus cleared away a great deal of matter which had been discussed in the lower courts on a legal basis only. The House of Lords expressed its entire satisfaction with the judgment of the court of appeal, holding that the Francis was wholly at fault and that the action of her captain was a typical illustration of unreasonableness.

The Titanic Disaster

The Senate Commerce Committee, which, through its sub-committee, headed by Senator William Alden Smith, investigated the Titanic disaster, has made its report to the Senate. Whatever may be said of Senator Smith's lack of experience in nautical affairs, there is no question whatever but that his committee secured a vast mass of useful information, and many facts, which might otherwise have escaped had there been any delay in the investigation, were put on record. The more the tragedy is surveyed and the circumstances surrounding it understood, the greater becomes the pity.

There is reason to believe that had assistance been promptly rendered by ships within easy steaming distance of the Titanic, every life on board would have been saved. The conduct of Capt. Lord, of the Leyland liner Californian, owned by the same company that owned the Titanic, is condemned as most reprehensible. The survivors of the Titanic insisted that

they could see the mast head light of a vessel in the distance, but as there appeared to be no way of attracting her attention, the conclusion was generally reached that they had mistaken a brilliant star hanging low on the horizon for the lights of a ship. There is reason to believe, though, that the mast head light was that of the Californian, and the senate committee comes to the conclusion that the Titanic's lights were visible to the Californian before she struck the iceberg and that the Californian must have seen the distress signals fired from the bridge of the Titanic after she struck it. The report says:

"The committee is forced to the inevitable conclusion that the Californian, controlled by the same company, was nearer the Titanic than the nineteen miles reported by her captain, and that her officers and crew saw the distress signals of the Titanic and failed to respond to them in accordance with the dictates of humanity, international usage, and the requirements of law. The only reply to the distress signals was a counter-signal from a large, white light, which was flashed for nearly two hours from the mast of the Californian. In our opinion such conduct, whether arising from indifference or gross carelessness, is most reprehensible and placed upon the commander of the Californian a grave responsibility."

It is known that the officers of the Californian, including the captain, have made a bad impression upon Lord Mersey, president of the British court. The captain admitted that before he turned in at 12:15 a. m., the second officer told him that a steamship, not many miles away, had sent up a white rocket. Captain Lord, who had seen her deck light, was sure that she was not the Titanic, although his wireless operator had been in communication with the Titanic earlier in the evening. James Gibson, an apprentice, testified that he saw three white rockets sent up by the unknown steamship after the captain had gone to bed in the chart room. Mr. Stone, the second officer, saw five more while Gibson was temporarily absent from the deck. A quotation from Gibson's testimony is as follows:

"There was a white mast-head light and a red side light, and he saw a glare of lights on her afterdeck. He was not sure whether he could see a second mast-head light. That ship was from four to seven miles away. Her mast-head light was flickering, and, thinking what he saw were Morse signals, he replied on the Morse keyboard, but got no reply. He called the attention of Mr. Stone, the officer of the watch, to the lights, and at 12:55, on his returning from below, Mr. Stone said the vessel had fired five rockets. After that he himself saw three white rockets, and so did Mr. Stone. At about 20 minutes past 1 o'clock, the second officer said to him, 'Look at the steamer now; she looks very queer out of the water.' He then looked through his glasses. It seemed to him that the lights of the ship did not seem natural, and that she had a very heavy list to starboard. The second officer said to him that the ship did not fire rockets at sea for nothing. They were talking about the ship all the time until she disappeared."

Stone, the second officer, being concerned about the signals, sent the apprentice Gibson to call the captain and tell him that the ship had fired eight rockets in all. Gibson went at once to the chart room—it was then about 2:05 a. m.—and made his reports. The captain asked "Were they all white?"

This inquiry is regarded as damaging testimony, as the first rocket which the captain learned about before he retired, was white. Distress signals are white, company signals usually having some colors in them.

Capt. Lord was a reluctant witness before the British court. He equivocated about the report that Gibson, the apprentice, had made to him. Lord Mersey dealt with the captain with great asperity, and in fact with all of the officers of the Californian, all of whom evinced a disposition to shield the captain. The attorney general asked him quite pertinently if he was not satisfied that the rocket he had seen was a company rocket why he did not call his wireless operator to inquire into the matter. In fact, the wireless operator of the Californian was not aroused until 5:50 a. m., when after considerable conversation among the officers on board the Californian regarding the rockets and the queer sight that they had seen, he was asked to send out a message asking for information. The steamships Mount Temple and Frankfort both reported instantly that the Titanic had struck an iceberg and had sunk.

Senator Smith in his speech that accompanied the committee's report declared that Capt. Lord must share the responsibility for the loss of life that occurred because he failed to direct his wireless operator to learn the name of the steamship in distress the moment that he saw the first white rocket. Had he done so, he could undoubtedly have saved the life of everyone on board the Titanic, because there would have been ample time, after he reached her, for him to have done so.

One For The American Ship

The house of representatives has passed a bill to the effect that no tolls should be charged to American vessels engaged in the coastwise service in passing through the Panama canal. This is one step in the right direction and if the senate agrees, American shipyards will be hives of industry for years to come.

There was, of course, much stress laid upon the fact that treaties were being violated, but it is a very curious circumstance that the United States can never do anything for its own interests without violating treaties. It seems as though our statesmen have always designed treaties with that special end in view. As a matter of fact, there can be no actual violation of a treaty, since practically all maritime countries repay out of their treasury all tolls imposed upon their vessels passing through the Suez canal.

In our opinion, the proposed measure should have gone a step further and granted free passage to American vessels engaged in foreign trade.

Harbor of Cleveland

Col. John Millis Government Engineer Shows Wherein It Excels and Wherein It Has Failed to Take Advantage of Its Opportunities —The Federal Government Has Appropriated Millions For the Development of the Outer Harbors But the City Holds It as an Industrial Waste

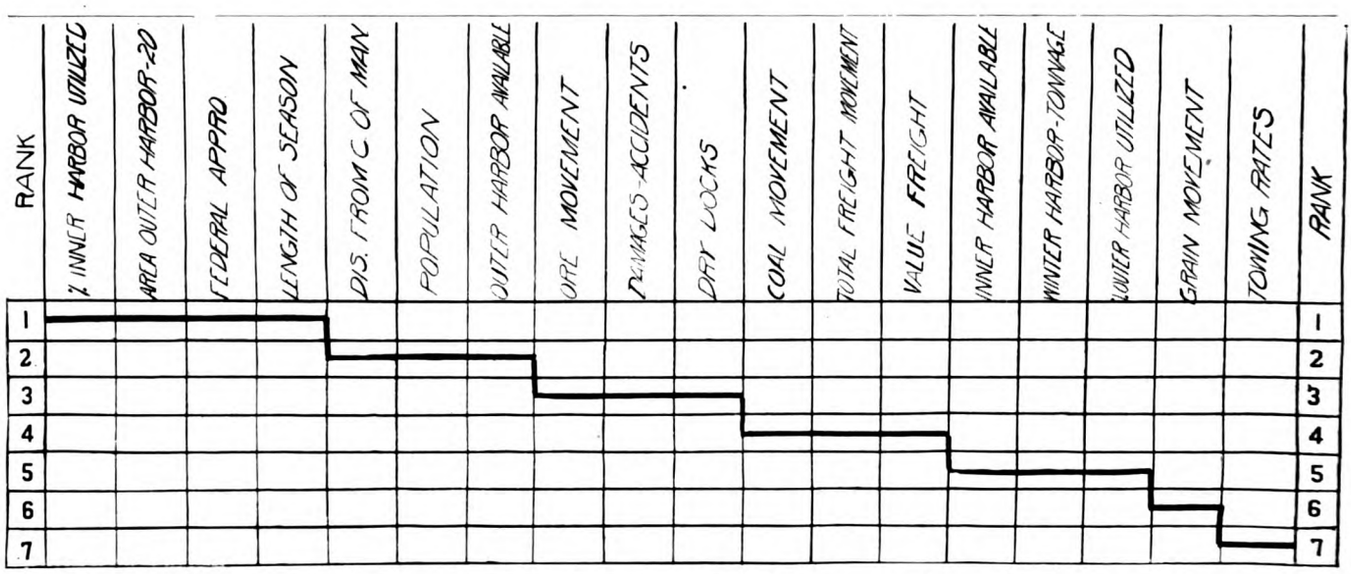
COL. JOHN MILLIS

COL. JOHN MILLIS, government engineer, with headquarters at Cleveland, delivered a striking and graphic address before the Cleveland Chamber of Commerce, on May 21, on the development of lake harbors, with especial reference to Cleveland harbor. It was brought out very clearly in that address that the federal government has appropriated more money for the development of Cleveland harbor than any other harbor on the lakes, so much, in fact, as to make the inquiry of other cities quite pertinent as to why Cleveland should be thus favored, especially as it is also pointed out, that the city has done so little to take advantage of the improvements provided by the general government. Cleveland stands first among lake cities in area of outer harbor available for deep-draught vessels, first in federal appropriations to develop that harbor, but fifth in its use for commercial purposes. What is the sense of asking the general government to appropriate and expend these huge sums of money if nothing is to be done with the improvement after it is created? It is true that the Pennsylvania Railroad System has just begun this spring to receive ore in the outer harbor, created by the west breakwater, the first use that ore-carrying vessels have ever made of the outer harbor. The outer harbor created by the east breakwater, however, is infinitely more capacious and capable of indefinite industrial expansion and yet it is lying absolutely latent. There is not a single industry along the whole length of the east breakwater that derives any benefit from its waterfront.

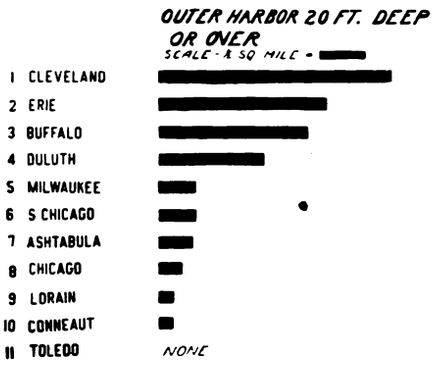
Col. Millis showed that except for a slight interruption during the civil war the federal government has regularly made appropriations for Cleveland's harbor since 1825, a period of 87 years, having appropriated altogether $7,500,000. When the first appropriation was made, Cleveland was a small village on the northwestern frontier, Oswego, Buffalo and Erie were young settlements, while Toledo, Chicago, Milwaukee and Duluth were not yet on the map.

Col. Millis' address was in main part as follows:

"The harbors that have been selected for comparison with Cleveland are Duluth (including Superior), Milwaukee, Chicago, South Chicago, Toledo, Lorain, Ashtabula, Conneaut, Erie and Buffalo. With some exceptions, these show a considerable resemblance in natural local features; we find a small river or stream flowing into the lake, where the shore is comparatively straight locally and where there was no natural protection to the river entrance; an extensive and reasonable flat and level country in the vicinity with a moderate elevation above the lake, and affording favorable conditions for railroad communications, and sufficient depths in the lake for navigation close into the river's mouth. The principal exceptions to be noted are at Duluth, where a natural bar forms the harbor and where the adjacent land is irregular and much of it has a high elevation; at Milwaukee, where there is also high land



CHART, SHOWING THE RELATIVE POSITION OF CLEVELAND IN THE POINTS ENUMERATED



in the vicinity; at Toledo, where the harbor proper is wholly on the river and at considerable distance inland, the river discharging into a large, shallow bay; and at Erie, where there is a natural bar or peninsula forming the harbor, and no river. At all except Duluth, Toledo and Erie, artificial harbors have been constructed by building enclosing and protecting breakwaters in the lake, and other improvements have been made at federal expense with the object of adapting the harbor to the largest type of lake vessel.

"The position of Cleveland relative to the others in this group of 11 harbors in respect to the several features specified, is as follows:

(1) Population, 1910—Cleveland, second.

(2) Distance from center of manufacturers of the United States—Cleveland, first.

(3) Federal appropriations for harbor improvements, to date—Cleveland, first.

(4) Area of outer harbor available for use of vessels drawing 20 feet or less—Cleveland, first. In this, as well as in certain other features of the harbors compared, conditions contemplated by plans for work officially adopted and in progress are considered, though such plans may not yet have been in all respects carried out.

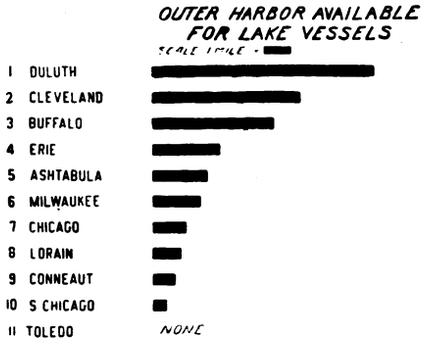
(5) Length of outer harbor front available for commercial purposes—Cleveland, second.

(6) Percentage of available outer harbor front now utilized for commercial purposes — Cleveland, fifth.

(7) Length of inner and river portion of harbor available for vessels—Cleveland, fifth.

(8) Percentage of inner and river portion of harbor now utilized for commercial purposes—Cleveland, first.

(9) Relative rates of charges of towing company for handling vessels at harbor—Cleveland, seventh.



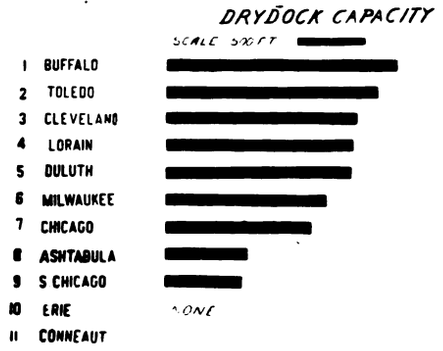
(10) Amount of damages to vessels resulting from accidents during the years 1900-1910—Cleveland, third.

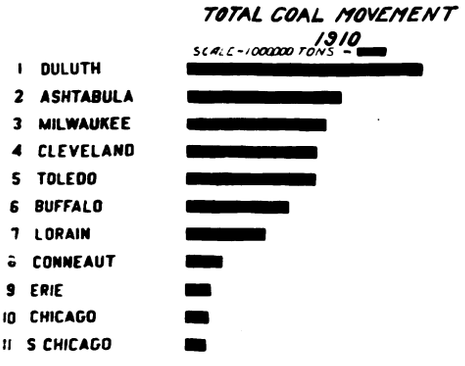
(11) Total tonnage of vessels laid up at harbor during winter 1910-1911—Cleveland, fifth.

(12) Average number days harbor open for navigation during year—Cleveland, first.

(13) Dry dock capacity—Cleveland, third.

(14) Total ore movement for 1910—Cleveland, third.





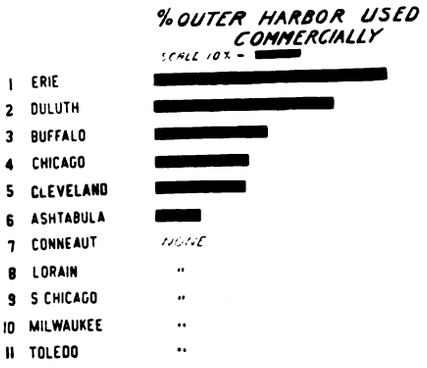
(15) Total coal movement for 1910—Cleveland, fourth.

(16) Total grain movement for 1910—Cleveland, sixth.

(17) Total freight movement, all classes, 1910—Cleveland, fourth.

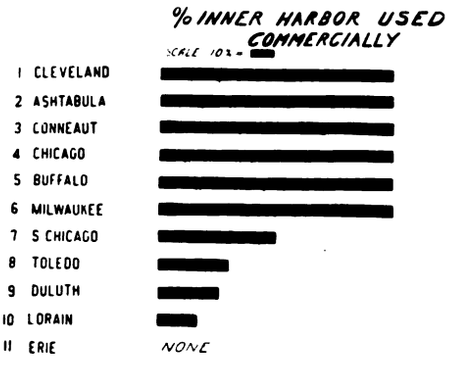
(18) Total value of freight handled by water transportation, 1910—Cleveland, fourth.

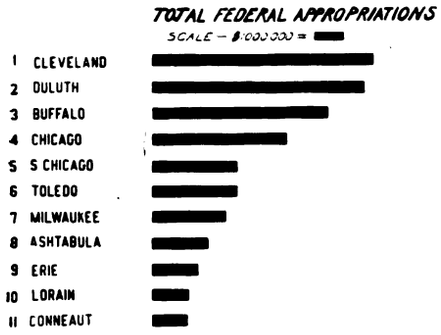
"A summary chart shows the position of Cleveland harbor with respect to each of the features above referred to, and indicates in a general way wherein it excels, wherein it is below the average and in what respects improvements are desirable and practicable.

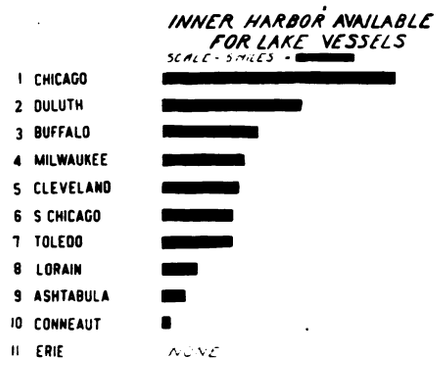


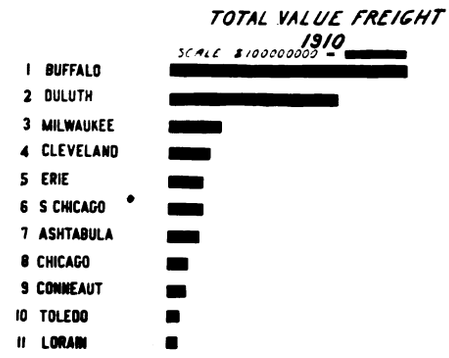
"Cleveland has not the advantages of a natural harbor that are found at Erie and Duluth, nor so favorable a strategic position as Chicago with respect to the existing railway transportation systems of the country and to a possible further development of inland waterway systems for barges and vessels of moderate draught, but that Cleveland's location is especially advantageous in relation to the great sources of fuel and ore and to the available transportation routes for bringing them together, and that it has resulting attractions for great manufacturing industries are well known facts; works of channel and harbor improvement and construction that have already been undertaken at local expense by many municipalities and by some of the states. In this connection notice should be taken of the present activities in Canada in the way of harbor and canal construction at public expense, particularly the proposed enlargement of the Welland canal, from which Cleveland, as well as other American cities, will profit more or less directly.

"Within two or three years it is expected that the enlarged Erie canal will be opened for traffic and the question of utilizing this great work and justifying the large expenditures involved to the fullest extent practicable, by extending its benefits beyond Buffalo, has already received attention. The pending river and harbor bill contains a provision for further survey and estimate for a barge canal connecting Toledo









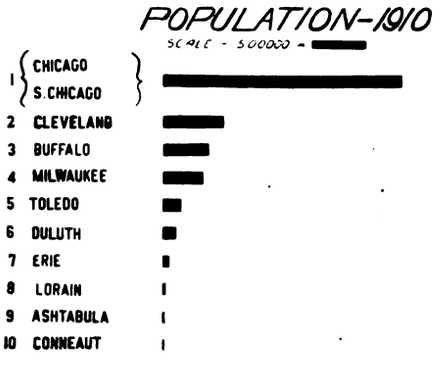
and Chicago, with connection to the inland waterways extending to the Mississippi. This will form a complete New York-Chicago barge waterway and will be of special interest to Cleveland.

"The Panama canal will also be opened at a comparatively early date. It has been predicted that this will cause a readjustment of commercial routes in the United States and will stimulate the demand for water transportation, and it has also been suggested that a large amount of construction plant on the Isthmus now owned by the government will be released and will then become available for canal construction at home. I venture to suggest, however, that the most direct and practical result will be that the completion of the Panama canal will release and render available at home the skill, experience, and confidence derived from the largest work of the kind that has ever been undertaken, and that public sentiment will have been so influenced by the successful carrying out of the work of such magnitude that many projects at home, already recogznized as needful and worthy, will then seem comparatively easy of accomplishment and the cost will also then appear to be less forbidding compared to the resources of the country that it does now. Cleveland should be ready to make the most of its share of the direct and incidental commercial advantages that pertain to these favorable conditions.

"This harbor ranks high in advantages of geographic position, in railroad facilities, in direct accessibility and ease of approach from the lake, in safety for vessels using it, and in length of the annual period of open navigation. The local conditions are especially favorable for arranging the inner harbor transportation and the land transportation routes on planes sufficiently separated from each other to avoid serious conflict or interference, although considerable outlay for bridges and viaducts will be necessary."

At this point Col. Millis approached the crux of the whole matter by declaring that Cleveland has not developed its harbor possibilities nor made a showing at all commensurate with the government's generosity in providing the outer harbor. The government has given Cleveland a harbor first in effective capacity, but through the lack of a progressive and enlightened policy on the part of the municipality it has not advanced beyond fifth place. Col. Millis said:

"In total of federal appropriations we are at the top of the list, and the outer breakwater is now approaching completion. In available effective capacity of the outer harbor Cleveland is first among the artificial harbors and is only surpassed by the natural harbor at Duluth, while it also has high rank in the capacity of its inner harbor, though it is now partly throttled at the railroad bridge across the entrance. *It must be stated, however, that in the extent to which the harbor possibilities have been developed and utilized, and in the amount of business done in water borne commerce, the harbor of Cleveland has not yet made a showing commensurate with its advantages and its possibilities.*

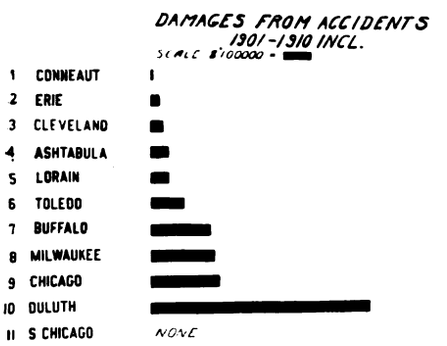


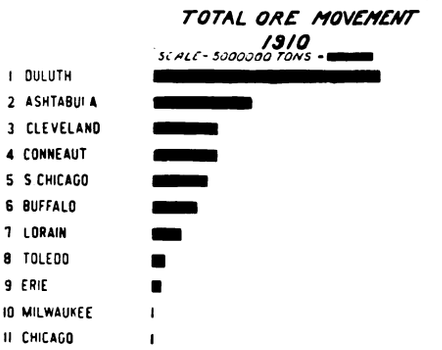
"It is scarcely necessary before this body to point out more specifically what the principal needs of the harbor are, as they are almost obvious from the foregoing, but I will name them briefly, and in what I consider their order of relative importance.

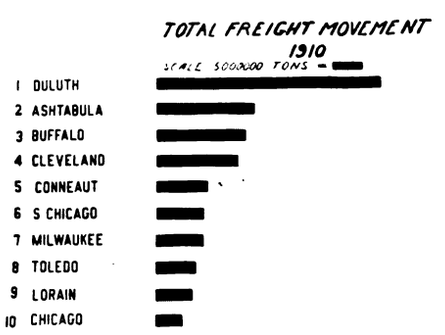
First.—*Utilizing for purposes directly connected with navigation all the outer harbor front not so utilized at present, and insuring railroad and highway communication with the same throughout.*

Second.—Widening the entrance to the inner harbor or river and reducing to a minimum the obstructions to navigation that pertain to the railroad crossing at that point.

Third.—Improving the navigation conditions of the river part of the harbor, and extending the navigable portions of the river, with proper co-ordination of land transportation routes, terminals and crossings in the river valley.







LAUNCH OF THE 鴻飛

THE Fei Hung, which was launched from the yard of the New York Ship Building Co., Camden, N. J., May 4, designed as a training ship for Chinese officers and men, is a protected cruiser of the following principal dimensions:

	Ft. in.
Length between perpendiculars.....	320
Breadth, molded	39
Depth, molded	22 6
Mean draught	14
Displacement (about)	2,600 tons
Speed (about)	20 knots

The hull is divided into numerous compartments by strong watertight bulkheads and flats. A double bottom extends throughout the machinery space, in which stowage is provided for feed water for the boilers.

The armament consists of two 6-in. rapid fire guns located respectively on the forecastle and the poop decks; four 4-in. rapid-fire guns on the upper deck at sides—two just abaft the forecastle and two just forward of the poop; two 3-in. rapid-fire guns, on each side of the upper deck amidships; six 3-pounder guns, three carried on each side of the upper deck; two 1-pounder guns located on the after end of the forecastle deck; and two 18-in. revolving torpedo tubes placed on the upper deck aft of amidships.

Protected By Armored Deck

The vital parts of the vessel are protected by an armored deck of the arched type, fitted in the vicinity of the water-line and extending throughout the entire length of the vessel. The coal bunkers are so arranged along the sides of the vessel, both above and below the protective deck as to give a maximum protection from gun-fire. The ammunition for the large guns is taken through armored tubes on its way to the guns, and an armored conning-tower is built on the forecastle deck, while an armored tube protects the gear rods, etc., passing from the conning-tower to under the protection deck. The searchlight platform, and navigating bridge are located over the after end of the forecastle bridge. A searchlight platform is also fitted over the fore end of the poop. The 6-in. guns are served by electrical operated ammunition hoists.

Accommodation is provided for a complement of 232 officers and men. A large forecastle and poop are built above the upper deck at the ends of the vessel, which provide accommodation for the petty and warrant officers, etc., aft, and for the captain and chief officers forward.

The two masts are made suitable for taking a wireless telegraph installation of 200 miles range.

Under the upper deck forward and aft accommodation is provided for the crew.

Propelled by Turbines

The galleys are placed in the casings on the upper deck amidships, and the steam and other boats are carried on skid beams and in davits along the sides of the upper deck.

Under the protective deck forward and aft are placed the magazines, shell rooms, store rooms, fresh water, fuel oil, etc. Cold storage for the preserving of meats, vegetables, and fish is placed above the protective deck amidships. The ship is lighted throughout by electricity.

The propelling machinery is of the Parsons turbine type, with three lines of shafting. The turbines are arranged in one engine room as follows: Center shaft, one main high pressure turbine with extra stage for cruising purposes; starboard shaft, one compressive turbine, one backing turbine; port shaft, one low pressure turbine, one backing turbine. The astern turbines are fitted in the same rotor casings as the low pressure turbines. By-pass valves are fitted around the first expansion of the high pressure for cruising purposes. All the turbine bearings and shaft bearings are arranged for forced lubrication, pumps being supplied for this purpose, together with an oil-cooler and tanks, etc. The shafting throughout is of forged steel. The propellers are three bladed, the bosses and blades being cast solid of manganese bronze; the center and starboard propellers turn right handed and the port turns left handed.

There are two condensers—one in each wing of the ship. They are cylindrical in form, with the castings built up of steel plates and angles. The circulating water is supplied by two pumps of the centrifugal type, driven by independent single-cylinder engines; these pumps are also arranged to draw from the bilges. The main-air-pumps are independent, direct acting, two in number, one for each condenser.

The two evaporators have a combined nominal capacity of 9,000 gallons of water per twenty-four hours for boilers and of 6,000 gallons of portable water in twenty-four hours. The two distillers have a combined nominal capacity of 6,000 gallons of portable water per twenty-four hours. The evaporators take steam from the main steam pipe, and the steam-head drain pipes lead through, and by-pass, automatic traps, to the feed tanks and main condensers. The shells of the evaporators have connections for directing the steam into the distillers and into the auxiliary exhaust pipe. The feed water for the evaporators is taken from the circulating pipes, after it has passed through the distillers, and from the sea.

There are three boilers of the Thornycroft water-tube express type located in two fire rooms—two in the after and one in the forward fire-room. The latter is fitted for burning oil as well as coal. The total heating surface is about 14,500 sq. ft. and the total grate surface about 271 sq. ft. Air is supplied to the fire by three blowers especially provided for that purpose. The ship has two funnels. The caption of this article is taken from life, being reproduced from the lettering on one of the cruiser's flags.

Homer L. Ferguson, vice president of the Newport News Ship Building & Dry Dock Co., believes that the Panama canal should be opened under proper regulations to all vessels, whether railroad controlled or otherwise. He was prompted to appear before the senate inter-oceanic committee by the fact that the Pacific Mail Steamship Co., which is a part of the Southern Pacific railroad system, desires to build four steamships of the largest size provided they are allowed to use the canal.

Frederick Alvin Jones, vice-president of the Eastern Steamship Corporation, of Boston, is one of the incorporators of the Boston & Yarmouth Steamship Co., Ltd., with headquarters at Montreal.

The Skinner Ship Building & Dry Dock Co., of Baltimore, has prepared plans for a steel oil barge, 153 ft. long by 23.3 ft. beam, for the Gulf Refinery Co., of New York.

Ship Construction Bill

Senator Smith's Bill Defining How Passenger Ships Shall be Constructed and How Provided With Life Saving Equipment

SENATOR William Alden Smith, as a result of his investigation into the Titanic disaster, has framed a bill which seeks to minimize the consequences of any similar accident in the future. There is no likelihood of the bill becoming a law at this session, as congress is now in its closing days and many other measures of somewhat similar character are pending, and are in a more advanced stage of legislation.

The Smith bill is certainly very sweeping in many of its provisions, and practically prohibits any foreign-owned vessel from entering or clearing from an American port unless its provisions are observed.

Section 1 provides that all foreign corporations with headquarters abroad engaged in carrying passengers to and from American ports shall file with the commissioner of corporations a copy of its charter and a sworn statement giving the following particulars:

Statement of Charter

(a) The state or country in which the corporation, joint-stock company or association was incorporated or organized or in which the principal place of business of the partnership is located.

(b) The date of incorporation or organization.

(c) The location of the principal office in the United States and the name and address of the agent or agents upon whom process may be served in this country, and attaching the consent of such agent or agents to accept service of such process.

(d) The names and addresses of officers and members of the board of directors.

(e) The amount of authorized capital stock and the amount thereof outstanding.

(f) The amount of authorized bonded or other indebtedness and the amount thereof outstanding.

(g) The assets and liabilities as shown by the last annual balance sheet.

(h) The name and principal place of business of any individual or corporation, joint-stock company or association owning 50 per cent or more of the stock of the corporation, joint-stock company or other association making such statement.

Section 2 provides that the usual certificate of inspection provided for by Section 4421 of the revised statutes, shall be withheld by the inspectors unless there shall be presented to them the certificate of the commissioner of corporations that all statements required under the preceding section have been furnished.

Section 5, dealing with the construction of vessels, is one that will greatly interest all shipbuilders since it practically requires both the longitudinal and transverse bulkheads in all passenger vessels carrying 100 or more passengers, whether operating on the ocean or the great lakes. The phraseology of this section is such that it is doubtless intended to embrace existing tonnage, which, of course, would mean extensive alterations in vessels now in commission. The exact language of Section 5 is as follows:

Construction of Vessel

Every steel ocean or coastwise seagoing steam vessel and every steel steam vessel navigating the great northern and northwestern lakes, carrying 100 or more passengers, shall have a water-tight skin inboard of the outside plating extending not less than 10 per cent of the load draught above the full load water line, either in the form of an inner bottom or of longitudinal water tight bulkheads, and this construction shall extend from the forward collision bulkhead over not less than two-thirds of the length of the vessel; and every such vessel shall have bulkheads so spaced that any two adjacent compartments of the vessel may be flooded without destroying the floatability or stability of the vessel. Watertight transverse bulkheads shall extend from side to side of the vessel, attaching to the outside shell. The transverse bulkheads forward and abaft the machinery spaces shall be continued watertight vertically to the uppermost continuous structural deck. The uppermost continuous structural deck shall be fitted watertight. Bulkheads within the limits of the machinery spaces shall extend not less than 25 per cent of the draught of the vessel above the load water line and shall end at a watertight deck. All watertight bulkheads and decks shall be proportioned to withstand, without material permanent deflection, a water pressure equal to 5 ft. more than the full height of the bulkhead. Bulkheads of novel dimensions or scantlings shall be tested by being subjected to actual water pressure.

That Senator Smith did not draw the bill is obvious, as it contains a great deal of technical knowledge with which he could not be expected to be acquainted. The provision concerning lifeboats reads as follows:

Every ocean or coastwise seagoing steam vessel and every steam vessel navigating between different ports on the great northern or northwestern lakes, allowed by its certificate of inspection to carry more than 50 passengers, shall have on board life boats of an aggregate carrying capacity computed in cubic feet equal to ten times the total number of her crew plus the total number of passengers stated in such certificate. The capacity in cubic feet of all such lifeboats shall be determined by the following rule:

Measure the length and breadth outside of the planking or plating and the depth inside at the place of minimum depth. The product of these dimensions multiplied by six-tenths resulting in the nearest whole number shall be deemed the capacity in cubic feet. Such lifeboats shall in all cases have sufficient room, freeboard and stability to safely carry one person for each ten cubic feet of its capacity, which fact must be determined by actual experiment in the water at the time of the first inspection of said boats after passage of this rule. Where a vessel is carrying boats of different types or capacities, at least one boat of each type or capacity shall be so tested. Lifeboats required on ocean vessels of 150 gross tons and over shall be of suitable dimensions and of not less than 180 cubic feet capacity. All such lifeboats shall be substantially constructed, and the tensile strength of the metal used therein shall be not less than 45,000 pounds and the reduction of area shall be at least 50 per cent. There shall be affixed to such lifeboats a plate or other device having thereon the builder's name, number of boat, date of construction of boat, cubical contents of boat, and number of persons said boat will carry, allowing 10 cu. ft. to each person, as above provided.

All such lifeboats shall be provided with air tanks, entirely independent of the hull or other construction, and of suitable non-corrosive material of a thickness of not less than No. 18 B. W. G., of a capacity of not less than 1 5/10 cu. ft. for each person in the case of metallic boats and not less than 1 cu. ft. for each person in the case of wooden boats. Such air tanks shall be firmly and securely fastened in the hull in such manner as will allow them to be temporarily removed; and in no case shall the tank be punctured or opened for such fastenings. The tops of such tanks shall be thoroughly protected by a grating or platform or by the thwarts or seats. All joints of air tanks shall be properly double riveted and tightly calked or securely hook jointed and efficiently soldered. The cubical contents of the air space of the air tank shall be stamped on the tank where the stamp can be seen when the air tank is placed in the boat. All air tanks shall be fitted with a connection of ½-in. outside diameter, for testing purposes, and shall be tested at the original and all subsequent annual inspections, and oftener if in the opinion of the inspectors.

it is necessary, by a pressure of not more than one pound to the square inch maintained for a period of not less than two minutes.

Then follows detailed specifications as to how metallic life boats shall be constructed.

Disengaging Apparatus

The provision concerning boat disengaging apparatus reads as follows:

Such lifeboats shall be provided with suitable lifeboat disengaging apparatus so arranged as to allow such boats to be safely launched while such vessels are under speed or otherwise, and so as to allow such disengaging apparatus to be operated by one person, disengaging both ends of the boat simultaneously from the tackle by which it may be lowered to the water.

The bill provides that every vessel except vessels navigating rivers only shall, while in operation, carry one life preserver for every passenger allowed to be carried by such vessel on its certificate of inspection, including each member of the crew. Then follows detailed specifications as to how these life preservers shall be made.

In the line of auxiliary life saving equipment the bill further provides:

Every steam vessel shall be provided with such numbers of lifeboats, floats, rafts, life preservers, line-carrying projectiles and the means of propelling them, and drags as will best secure the safety of all persons on board such vessel in case of disaster: Provided, That line-carrying projectiles and the means of propelling them shall not be required on steam vessels plying exclusively upon any of the lakes, bays or sounds of the United States. The board of supervising inspectors shall, subject to and in furtherance of the provisions of this section, fix and determine by their rules and regulations, the character of lifeboats, floats, rafts, life preservers, line-carrying projectiles and the means of propelling them, and drags that shall be used on such vessels, and also the character and capacity of pumps or other appliances for freeing the steamer from water in case of heavy leakage, the capacity of such pumps or appliances being suited to the navigation in which the steamer is employed.

The provision in the present statute relating to fire pumps is amended by adding to the end thereof the following:

All steam fire pumps required shall be supplied with connecting pipes leading to the hold with stop cocks or shut-off valves attached and so arranged that such pumps may be used for pumping and discharging water overboard from the hold.

Concerning life boat drills the bill provides:

That on every ocean-going or coastwise steam vessel and steam vessel plying between different ports on the great northern or northwestern lakes, allowed by its certificate of inspection to carry 50 passengers or more, at least four members of the crew, skilled in handling lifeboats,, shall be assigned to each lifeboat carried on board such vessel. Each lifeboat, manned with its crew, shall be lowered into the water at least twice in each month and the crew drilled in handling and rowing it, and at least once in six months all the lifeboats on such vessel shall participate in the drill, and the fact of every such drill and practice shall be noted in the vessel's log. Before such vessel sails from any port in the United States a place in one of the vessel's lifeboats shall be assigned to each passenger and member of the crew. The number of the boat and the place so assigned to each passenger and member of the crew and the shortest way to said boat shall be stated in a notice posted in his stateroom or over his berth.

The bill provides that the vessel shall be equipped with at least two electric search lights and that any person who shall discharge or permit the discharge of any rocket or candle from any vessel on the high seas or within the jurisdiction of the United States for any purpose other than a signal of distress, shall be guilty of a misdemeanor punishable by law as like offenses are now punishable.

Wireless Telegraphy

The bill also seeks to amend the act regarding wireless telegraphy on board vessels as follows:

"Section 1. That from and after July 1, 1912, no clearance shall be granted by any customs officer to any steam vessel of the United States or of any foreign country navigating the ocean or the northern or northwestern lakes, and permitted by her certificate of inspection to carry 50 or more passengers, unless such vessel shall be equipped with an efficient apparatus for radio-communication, in good working order, capable of transmitting and receiving messages over a distance of at least 100 miles, day or night, under all conditions, except where atmospheric disturbance makes it unsafe for the operator to work the set. An auxiliary power supply, independent of the vessel's main electric power plant, shall be provided which will enable the sending of messages over a distance of at least 100 miles, day or night, under all atmospheric conditions safe for an operator to work, until the wireless room is submerged or destroyed. Direct means of communication shall be provided between the wireless room and the bridge either by clear-speaking telephone, voice tube or messenger, so that the operator may at all times communicate with the bridge without leaving his station.

"The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every willful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators and watches, shall subject him to a penalty of $100.

"That the provisions of this section shall not apply to steamers plying only between ports less than 200 miles apart."

It is, of course, somewhat early to make any comment on measures seeking to prevent in future any similar accident as that which befell the Titanic. Undoubtedly as a result of this great tragedy there will be worked into the statutes wise provisions tending to the greater safeguarding of life, but at present there is much that is hysterical proposed and some of it absolutely ridiculous. Some of the vessels reaching New York since the disaster have been so choked up with lifeboats that they have been compelled to carry a portion of them outboard in the davits, preventing the steamer from being docked until the boats nearest the wharf could be lowered and stowed inboard on deck below.

Commerce of Lake Superior

The commerce of Lake Superior, as measured by the canals at Sault Ste. Marie, reached 8,936,693 tons in May, which is the heaviest May movement on record, being 2,811,675 tons greater than the movement for May, 1911, and 408,427 tons greater than that for May, 1910, which was the record year for the movement of commerce on the lakes. The movement of grain was practically double that of a year ago and even soft coal shows an increase. Following is the summary:

	To June 1, 1911.	To June 1, 1912.
EAST BOUND.		
Copper, net tons	21,405	19,785
Grain, bushels	7,445,191	12,995,800
Building stone, net tons	612	2,282
Flour, barrels	1,035,137	1,057,960
Iron ore, net tons	3,585,990	5,546,215
Pig iron, net tons	7,598	.....
Lumber, M. ft., B. M.	80,431	68,527
Wheat, bushels	17,392,591	35,496,981
Unclassified freight, net tons	11,773	27,817
Passengers, number	1,921	1,662
WEST BOUND.		
Coal, anthracite, net tons	266,822	17,848
Coal, bituminous, net tons	1,792,324	1,653,022
Flour, barrels	125	.....
Grain, bushels	.....	.....
Manufactured iron, net tons	77,007	113,807
Iron ore, net tons	3,130	500
Salt, barrels	175,815	219,022
Unclassified freight, net tons	220,792	157,508
Passengers, number	2,790	1,970
SUMMARY OF TOTAL MOVEMENT		
East bound, net tons	4,531,433	7,128,152
West bound, net tons	2,386,172	1,975,459
Total	6,917,605	9,103,611
Vessel passages	2,641	3,379
Net registered tonnage	5,609,857	7,972,292

Converted Into Oil Burners

The Prince George and Prince Rupert Which Came Over Two Years Ago From Great Britain Adopt Oil Fuel

CONVINCED that the installation of oil burning apparatus was warranted by its economy in comparison with coal and its saving in space and cleanliness the Grand Trunk Pacific Steamship Co. has had its speedy passenger liners, Prince Rupert and Prince George, operating between Seattle, Prince Rupert and Stewart, B. C., converted into fuel oil burners. The expense in actual outlay and in time has been heavy, but the operating officials are already more than satisfied that the results will fully justify the expenditure.

Both these vessels are again in service and the oil system is working satisfactorily. The Prince George was withdrawn from service in November, but owing to delay in assembling the material, this vessel was not ready for service until March, when she relieved the Prince Rupert, which was placed in operation again this month. These vessels came to this coast from the yards of the builders on Newcastle-on-Tyne less than two years ago. They are fast and commodious steamers and have proved well adapted for the trade in which they are operating.

Has Given Satisfaction

The two steamers were converted at the yards of the British Columbia Marine Railways Co., Esquimalt, B. C., under the supervision of Capt. C. H. Nicholson, manager of the Grand Trunk steamship fleet. The Prince George, which has been operating two months under liquid fuel, has given splendid satisfaction and equal results are expected from the Prince Rupert.

In planning for an oil system, the quantity of fuel to be carried must be carefully figured, but this, of course, is a question that must be answered by individual requirements. The route, the speed maintained and the facilities for fueling must be taken into consideration. Engineers state that a handy rule is to divide the indicated horsepower developed by 10, this giving the consumption in barrels per steaming day of 24 hours. Generally speaking, four barrels of fuel oil will equal one ton of good coal.

Where to place the oil tankage is another important problem and one sometimes difficult to solve. In vessels, where double bottoms are required for water ballast only, the oil is frequently stored in this space. But this arrangement presents several difficulties such as proper venting arrangements. Owing to the low temperature of sea water, the density and low viscosity of fuel oils required to undergo the British admiralty and Dominion tests, it is necessary to rig up steam heater coils to the suction pipes to insure a constant and uninterrupted flow to the pumps. From their location such coils are difficult to overhaul and there is the constant possibility of the introduction of water into the oil by the means of leaks.

Trim Not Disturbed

In converting the Prince Rupert and Prince George, which are high-speed vessels, it was necessary that great care be taken not to disturb the displacement and trim, which were very carefully worked out by the designer and builder. These steamers, being fitted with full hot and cold running water service in each stateroom, requiring considerably more than the average supply of fresh water, an additional problem was presented. The double bottoms were adapted for carrying the fresh water and consequently if this space was to be utilized for fuel oil, an equal amount of water storage must be provided elsewhere. Finally it was decided to build the oil tanks in the regular bunker space, where they would offer the least disturbance to trim and stability and to the water systems of the vessels. In addition, this plan possessed the important advantages of convenience in filling and venting arrangements without disturbing cabins or exteriors. Being located above the ship's tank tops, it was not necessary to install suction heaters.

Each vessel is provided with five tanks, built of heavy steel and protected by fore and aft and athwartship bulkheads to prevent smashing. Before the contracts were awarded, the tank plans were approved by the Dominion government steamboat inspectors, the British Board of Trade and by Lloyds. The tankage is sufficient to furnish oil for a round trip, about 1,700 nautical miles at 18 knots an hour with ample allowance for port consumption. Full sized gate valves have been provided on the inside of pipe openings operated by spindles from the top of the tanks in addition to the usual flanged fittings required by law. For filling, the arrangements are simple and complete. It is possible to fill the forward and after tanks separately. The after filling pipe leads to an 8-in. manifold, by which not only can the filling of any tank be controlled, but any tank can be filled from any other discharged overboard, if necessary. Thus all working valves are constantly under observation, being in one place.

After carefully studying the well known methods of atomizing fuel oil, the Grand Trunk officials decided upon the mechanical atomizing system as the cheapest and most efficient. Thorough investigation resulted in the selection of the Dahl system, manufactured by the Union Iron Works of San Francisco, it being found well adapted to Howden's forced draught, with which these vessels are equipped, in addition to being simple and less costly to install. This system consists of three specially designed heaters tested to 700 lbs. pressure. They can be used singly or in series, two being sufficient to steam the vessel, while working under full power, the third being held in reserve. Being of the simplest design, the burners can be taken out and changed within a few seconds and the various sized tips can be changed as required for increasing or diminishing the consumption.

Future Supply of Oil

Before deciding to adopt fuel oil, Grand Trunk officials gave careful consideration to the future supply of oil and reached the conclusion that there is no immediate danger of its giving out. The indications are that fresh oil fields will be developed in Alaska and British Columbia, so that there is every likelihood that the supply will be adequate and prices will eventually become more reasonable notwithstanding the great increase in consumption. There are splendid fueling facilities at all the important ports on this coast. While in some instances oil barges are maintained and will go alongside a vessel at a pier to supply fuel, it is necessary in most cases to proceed to a shore station at the expense of moving the ship and the loss of time. To obviate this difficulty, the Grand Trunk has erected its own dock at Vancouver, B. C., where its vessels, operating on a fast schedule, can discharge and take on passengers, baggage, mails and freight, in addition to fueling and watering in one berth. At this dock, the storage tank holds 32,000 barrels, while a measuring tank of 1,000 barrels capacity and a pumping plant of 1,000 barrels per hour delivery are also provided. By means of an 8-inch pipe, leading down to the dock with two connections to the ship, both forward and after tanks can be filled simultaneously. The tanks stand on

FUEL LIGHTER PITTSBURGH, OF THE PITTSBURGH COAL CO.'S FLEET

elevator which lifts the coal to a swinging boom. The swinging and telescopic chute is fastened to the end of the boom and is so adjustable that it is possible to discharge coal into the bunkers of the largest steamers without trimming. It can be seen that its sphere of action is considerable, as it will fuel any class of carrier, no matter how high it may be out of the water. This arrangement dispenses with a great deal of labor. In fact, the lighter is operated by a crew of four men, excluding the captain. Independent motor drive is used to operate the conveyor and the coal handling machinery, which is controlled from the operator's house placed on top of the elevator. This machinery, which was designed and built by the C. O. Bartlett & Snow Co. of Cleveland, is of the automatic switch type and is interlocked so that the various conveyors and elevators cannot choke up if the fuse in the supply line between the Ridgeway generator set placed in the after cabin and any one of the seven motors should blow out. Three motors are required to operate the boom and chute and one for each conveyor and elevator.

The regular way of loading the lighter is to have a swinging boom equipped with buckets similar to those on the vessel let out from the docks. Coal is fed into these pockets from a hopper beneath elevated tracks into which the fuel is delivered directly from hopper bottom cars. In addition the lighter can also be loaded directly through an ordinary car dumper.

Safety devices are provided for the entire equipment, which is rigidly constructed and arranged with a view to securing easy operation of all parts. Another feature of it is the design which tends to give stability to the boat, the list being only about six inches under the extreme conditions of loading and the swinging of the boom to the maximum outward position. The lighter is self-propelling, having twin-screws driven by two 18 x 20 engines, supplied with steam from two boilers, 12 ft. diameter and 12 ft. long, allowed 150 lbs. pressure. It is therefore extremely responsive to the helm and can be handled very easily in the tortuous channels of the Cuyahoga river. The lighter is unusually seaworthy for a craft of its kind, so that it is possible to run out into the lake beyond the breakwater to fuel a vessel should occasion require. It is designed for a speed of twelve miles per hour.

masts, with derrick boom of 5-ton capacity on foremast; schooner rig and equipped with a wireless outfit.

The tugs are very large and powerful, being well adapted for the work they may be called upon to do in the event of war.

Quarters for a naval complement of four officers, three chief petty officers and thirty-five men, are arranged as follows:

Captain's quarters aft of pilot house.

Officers' quarters in forward end of main deck house.

Crew on lower deck, forward.

Chief Petty Officers and engine-room force on lower deck, aft.

Toilets, galley, etc., are forward of engine space, in main deck house.

There is fitted forward a steam windlass, combined with towing bitt, the windlass having warping ends. A reversible capstan is fitted on main deck aft. Two steam winches of 5-tons capacity each are located, one at foremast on main deck, the other at the main mast on top of deck house. A towing machine is provided in the after end of the main deck house and supplied with necessary hawser rollers, etc., a towing bitt is also fitted aft. Steam steering engine is located in engine room and has connection in pilot house. Combined steam and hand steering wheel fitted on after end of deck house top. Vessel's boats consist of one 21-foot motor dory, one 28-foot whale boat and one 16-foot dinghy, the former two being slung under davits. One 4-inch Monitor fire hose nozzle is fitted on top of pilot house and a similar one on top of deck house aft. A machine shop, amply equipped, is located upon platform on port side of engine-room.

Sea Going Tugs For Navy

Two single-screw, sea-going tugs, Sonoma and Ontario, are at present being completed by the New York Ship Building Co, at Camden, N. J., for the United States navy. Each vessel is of the following dimensions:

	Ft. in.
Length, overall	185 2
Length, between perpendiculars (fore side of stem to after side of rudder post)	175
Beam, molded	34
Beam over guards	35
Depth, molded, to main deck	20 3
Mean load draught (salt water)	12 6
Speed, loaded, at sea	14 knots

The tugs are of open-hearth steel throughout, and built in accordance with the rules of the American Bureau of Shipping and under special survey. They are sub-divided by seven watertight bulkheads and have raked stem and elliptical stern; two

Orders Three More Steamers

The Maryland Steel Co., Sparrow's Point, Md., has received contract from the American-Hawaiian Steamship Co. for the construction of three additional steamers. This makes a total of eight vessels for which contracts have been placed with this yard by the American-Hawaiian Co. during the past year. The vessels are all sister ships and are to be 428 ft. 9 in. in length over all, 414 ft. 2 in. between perpendiculars, 53 ft. 6 in. deep and 39 ft. 6 in. deep. They will be equipped with quadruple-expansion engines with cylinder diameters 25½, 37, 53½ and 78 in. by 44 in., supplied with steam from two Scotch boilers. They will burn oil.

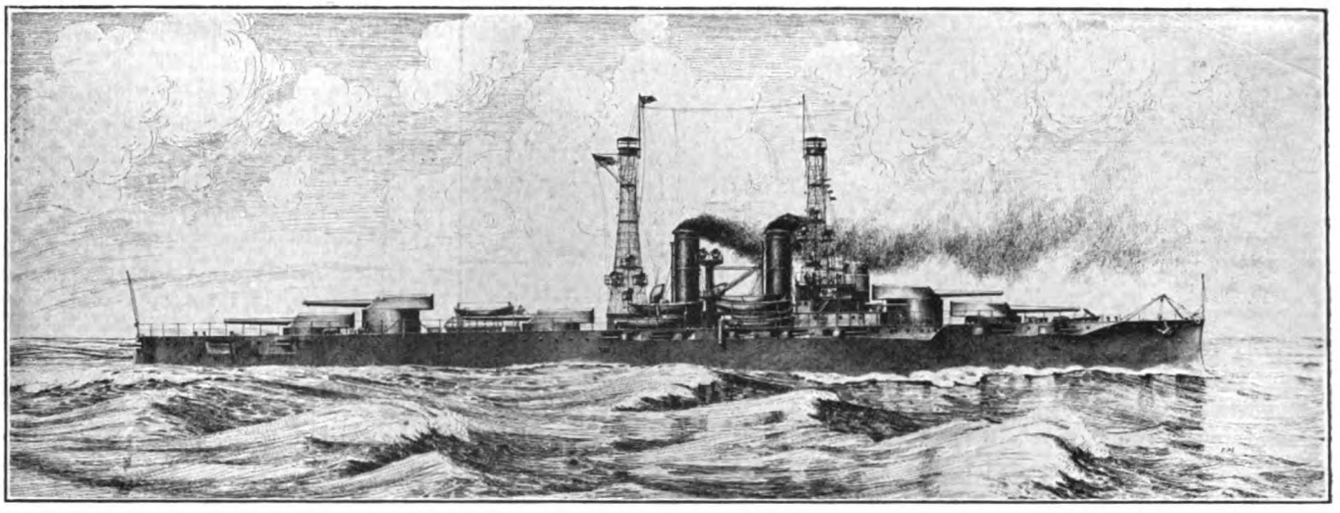
Battleship Texas Launched

The battleship Texas was launched May 12 from the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va., contract for which was awarded to the company Dec. 17, 1910, upon its bid of $5,830,000, with the bidders' design of reciprocating engines installed. The general dimensions and features of the Texas are as follows:

Length on designer's waterline, 565 ft.; breadth, extreme at designer's waterline, 95 ft. 2⅝ in.; mean trial displacement, 27,000 tons; mean draught to bottom of keel at trial displacement, about 28 ft. 6 in.; total coal bunker capacity, about 2,850 tons; total fuel-oil storage, 400 tons; coal and fuel oil carried on trial, 2,167 tons; feed water carried on trial, 213 tons; speed on trial. not less than 21 knots.

Armament: Main battery—Ten 14-in., 45-caliber breech-loading rifles; four submerged torpedo tubes. Secondary battery—Twenty-one 5-in. rapid-fire guns, 51-caliber; four 3-lb. saluting guns; two 1-lb. semi-automatic guns for boats; two 3-in. field pieces; two machine guns, 30-caliber.

The sister ship New York is being built at the New York navy yard. The keel of the Texas was laid April 17, 1911, and the New York, Sept. 11, 1911. The percentage of completion of the Texas on May 1 last was 57.7 per cent and of the New York 26.6 per cent.



THE BATTLESHIP TEXAS AS SHE WILL LOOK WHEN COMPLETED

Damage to Colman Dock

It was briefly noted in THE MARINE REVIEW for May that the Alaska liner Alameda had run into the Colman dock, at Seattle, cutting off the end of the pier and sinking the stern-wheel steamer Telegraph, moored alongside the pier. Herewith is published a photograph showing the damage done to the pier. The accident was caused by a mistake of signals and the United States local inspectors at Seattle have suspended temporarily the licenses of second assistant and third assistant engineers of the Alameda. There was no conflict in the testimony of the two engineers. The second assistant engineer, who was handling the engines, stated that he understood the third assistant, who was handling the telegraph, to say "full speed ahead". By simply looking at the dial, however, he could have seen that he was working his engines directly opposite to the signal transmitted. The third assistant was also held negligent in not noticing that the engines were working contrary to the signal given from the bridge and answered correctly by him. Capt. John A. O'Brien, when he realized that the signal had not been observed, immediately starboarded his helm and dropped anchor but the Alameda's impetus was so great that after cutting through 150 ft. of timber and piling she struck the steamer Telegraph with such force that the latter sank within a few minutes. Four people on the dock were injured.

The Telegraph has since been successfully raised by means of lines swept under her hull and made fast to scows.

THE COLMAN DOCK AFTER THE ALAMEDA STRUCK IT

The steamer Hamiltonian, building for Norcross & Co., Toronto, was launched from the yard of the Western Dry Dock & Ship Building Co., Port Arthur, Ont., on May 25. Norcross & Co. are having a similar steamer built at the yard of the Clyde Ship Building & Engineering Co., Port Glasgow, Scotland, to be equipped, however, with Diesel engines.

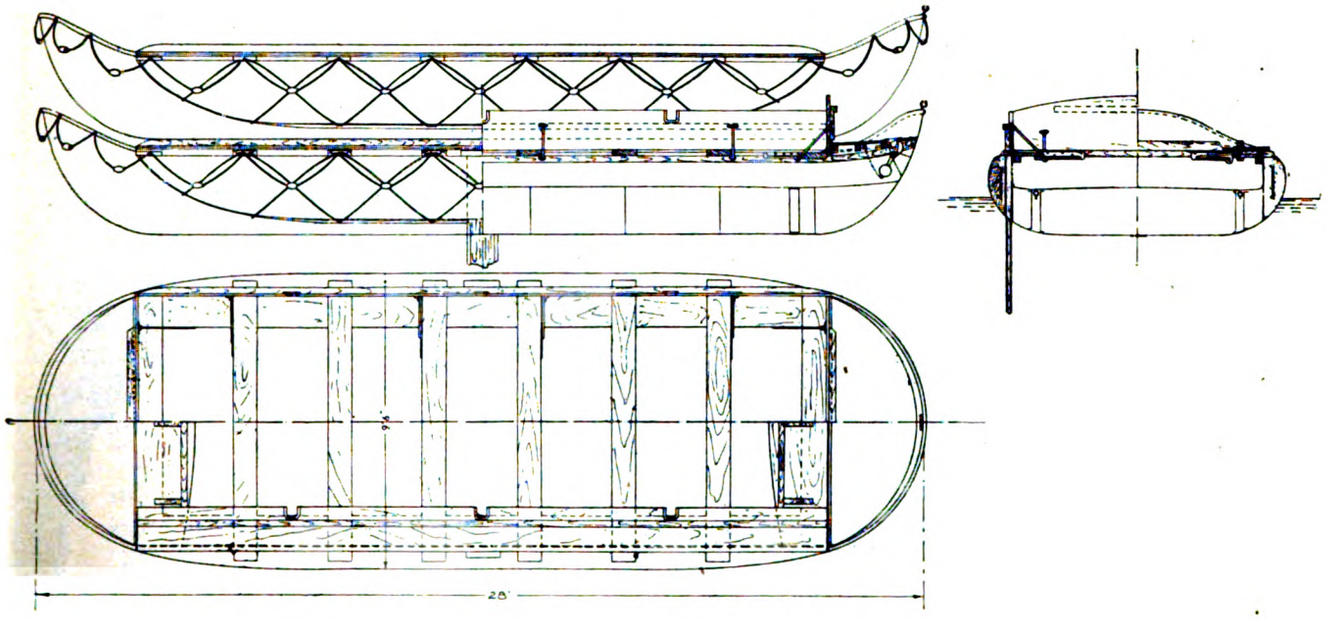
Lundin Decked Lifeboat

A new type of lifeboat, invented by Capt. A. P. Lundin, president of the Welin Marine Equipment Co., Long Island City, N. Y., has recently been thoroughly tested by the United States steamboat inspection service and has met with the approval of the board. This type of boat can be nested, an advantage which makes it extremely serviceable with the Welin apparatus which permits the carrying of a number of boats under one set of davits. The new Lundin boat is an outcome of the Titanic disaster. As will be seen by the illustrations, the boat is built practically on the lines of a Norwegian skiff, except that both ends are alike. The hull is built of galvanized iron or other metal, there being no woodwork in the keel, stem or stern. Wood is used only in the reinforcement of the gunwale, thwarts, folding sides and ends, and the small raised decks forward and aft. There is a metal deck secured through the shell-plating and transverse metal floors divide the lower portion of the hull into a series of compartments. The boat is self-bailing, owing to a number of drain pipes fitted through the bottom which carry off any water that may be shipped in a rough sea, but prevent its influx through outside pressure.

BUOYANCY OF LUNDIN DECKED LIFEBOAT

For a given length of the hull proper, this boat is capable of accommodating about 20 per cent more passengers than the ordinary type of lifeboat and two can be stowed on top of each other in the same deck space occupied by a regular boat of the same length.

The stability and seaworthiness of this new boat was thoroughly demonstrated in the test made before Gen. Uhler, of the board of steamship inspection, recently. Sixty-two men had been placed in the boat and the increased draught was less than 5 in. over that of the empty



Lundin Decked Lifeboat.

Manner of stowing Lundin Decked Lifeboat, showing space saving.

boat. This left a very substantial freeboard, exclusive of the folding sides and ends. The boat owes its unusual buoyancy and stability to large but very light Balsa wood fenders secured to its sides and also to the advantageously located air tanks, subdivided into nine compartments. The general construction of this boat and manner of stowing is shown in the diagram.

The water tanks are secured under the fore and aft thwarts, one on each side amidships; space for storing provisions and implements is provided between the middle deck and the small raised deck at each end of the boat. The cars are secured with brackets on the outside of the folding sides and the boats are equipped with a sail. There is ample room to secure a mast on one of the fenders, thus leaving the inside of the boat entirely clear for passengers and crew.

It has been suggested that an equipment for passenger steamers would be an outfit of these new Lundin deck lifeboats with a few of the regular type boats equipped with motors, as the new type of boat lends itself readily to towing in all kinds of weather, besides being very easy to row and maneuver.

Welin Davits

Alexander Welin, the inventor of the Welin quadrant davit, which is generally regarded as the most efficient means of launching lifeboats from the decks of liners, discussed the question of safety at sea under the auspices of the American Museum of Safety at 29 West Thirty-ninth street, New York, recently. George Uhler, supervising inspector general of the steamboat inspection service, was the guest of honor and presided. Mr. Welin stated that he did not agree with those who advocated an arrangement of detachable deck houses to act as rafts. He regarded such an arrangement as impracticable, as it would be impossible to make such houses watertight if they are to have doors and windows. Without these advantages, of course, they would be of no use under ordinary circumstances. He added that he was convinced that a properly constructed lifeboat placed under efficient launching gear and in charge of men efficiently drilled afforded the best means of saving life at sea.

The La Salle Machine & Tool Co., La Salle, Ill., are the manufacturers and sole agents of the Welin davit for the great lakes district.

The Craig Ship Building Co., Long Beach, Cal., will build a steamer, 230 by 40 by 16 ft., for the Dollar Steamship Co., of San Francisco.

Lake Ship Building

The Toledo Ship Building Co. has closed contract with the Mackinac Transportation Co. for a car ferry to operate in the Straits of Mackinac. The new ferry will be 266 ft. over all, 62 ft. beam and will have capacity for 18 standard cars. The machinery of the old car ferry Sainte Marie will be installed in the new boat. The new ferry is to be completed by Dec. 1 next.

During the month the American Ship Building Co. closed contract with the Standard Oil Co. for three steamers and three barges of Canadian canal size. All of the vessels will be built on the Isherwood system and will be 260 ft. over all, 250 ft. keel, 43 ft. beam and 23 ft. deep.

American Transportation Co's New Steamers

The American Transportation Co., which was incorporated at Wilmington, Del., last month with a capital stock of $1,200,000 in $100 shares divided into $850,000 common and $350,000 preferred, is the company which has given orders to the Great Lakes Engineering Works of Detroit for three steamers for salt water service. These boats will be operated by James W. Elwell & Co. of New York. The steamers are 261 ft. long over all, 43 ft. 6 in. beam and 28 ft. 5 in. deep, having a deadweight carrying capacity of 4,100 gross tons on a draught of about 24 ft. They are to be so constructed that they may burn oil if necessary. The steamers will have four large hatches, each hatch being equipped with two winches operating booms having a lifting capacity of six tons, in addition to which there will be a 30-ton boom at No. 2 hatch. They will have a 'tween deck and three large side ports on each side, thus adding to the facilities for the quick handling of cargo. It is expected that two of the boats will be delivered during the fall. The steamers are being built to the classification of both Lloyds and the American Bureau of Shipping.

H. H. Raymond, vice-president and general manager of the Clyde Steamship Co., together with Capt. W. M. Tupper, superintendent of the Line, and J. J. Logan of the Logan Concrete & Engineering Co. of Jacksonville, Fla., have purchased the Penn Steamship Co. Line operating between Tampa and New Orleans. The name of the company will be changed to the Gulf & Southern Steamship Co. The steamship Brunswick has been purchased to be added to the fleet and as soon as alterations are completed on her at the Merrill-Stevens Co.'s yard at Jacksonville, she will be renamed Osceola. The Clyde Steamship Co. is not interested in the transaction.

Iron Ore Shipments

Iron ore shipments during May were 5,919,074 gross tons as against 3,684,819 gross tons for May, 1911, an increase of 2,234,255 tons. April ore shipments were only 204,042 tons as against 331,645 tons for April, 1911, so that it becomes quite clear that shippers have determined upon very heavy movement of ore this season. The movement to June 1 totals 6,123,116, as against 4,016,464 tons for the corresponding period of last year, an increase of 2,106,652 tons. Shipments by ports were as follows:

Port.	May, 1911.	May, 1912.
Escanaba	436,008	712,359
Marquette	204,093	356,914
Ashland	226,528	513,484
Superior	1,239,153	1,931,307
Duluth	896,113	1,276,027
Two Harbors	682,924	1,128,983
	3,684,819	5,919,074
1912 increase		2,234,255

Port.	To June 1, 1911.	To June 1, 1912.
Escanaba	529,540	792,889
Marquette	218,931	356,914
Ashland	267,865	521,772
Superior	1,315,892	1,995,723
Duluth	947,155	1,294,264
Two Harbors	737,081	1,161,554
	4,016,464	6,123,116
1912 increase		2,106,652

Lake Erie Ore Receipts

Out of a total ore movement of 5,919,074 gross tons during May, 4,156,598 tons came to Lake Erie ports, distributed as follows:

Port.	April, 1912.	May, 1912.
Buffalo	4,263	598,601
Erie	.....	36,986
Conneaut	.....	1,112,787
Ashtabula	7,951	911,544
Fairport	.....	97,917
Cleveland	9,378	760,379
Lorain	.....	501,781
Huron	.....	27,269
Sandusky	.....	.....
Toledo	8,807	165,657
Detroit	.....	33,680
Total	30,399	4,156,598

City of Detroit III

The new steamer City of Detroit III, built by the Detroit Ship Building Co. for the Detroit & Cleveland Navigation Co., was given a preliminary trial on May 30 for the purpose of adjusting her machinery and auxiliaries for her trial run which took place June 8.

John H. Dialogue & Son, Camden, N. J., have received contract to build a fireboat for the city of Galveston.

Ownership of White Star Line

It is well known that the White Star Line which owned the ill fated Titanic, is controlled by the International Mercantile Marine Co., originally styled the International Navigation Co., and more commonly called the Morgan shipping combine. It is not generally understood, however, how the control is exactly exercised. The White Star Line is owned by the Oceanic Steam Navigation Co., of which the directors are J. Bruce Ismay, H. A. Sanderson and Lord .Pirrie. The capital of the Oceanic Steam Navigation Co. is £750,000 in £1,000 shares. According to the last report the shareholders were:

	Shares.
J. Bruce Ismay, 30 James St., Liverpool, merchant	1
H. A. Sanderson, 30 James St. Liverpool	1
The International Navigation Co., 30 James St., Liverpool	742
Lord Pirrie, Queens Island, Belfast	1
J. Gray, 5 Newcourt, Lincoln Inn, London	1
W. S. M. Burns, 22 Old Broad St., London, merchant	1
E. C. Grenfell, 22 Old Broad St., London, retired	1
V. H. Smith, 22 Old Broad St., London	1
A. Kerr, 22 Old Broad St., London	1
Total	753

The International Navigation Co., which is the largest share holder in the Oceanic Steam Navigation Co. and has complete control, is in turn controlled by the Fidelity Trust Co. of Philadelphia. The International Navigation Co. was registered in 1883 with a capital of £600,000 in £10 shares, which was increased to £700,000 in £10 shares in 1894. The directors at the last report were J. Bruce Ismay, H. A. Sanderson, C. F. Torrey and H. Concannon, and the share holders were:

	Shares.
T. H. Withers, 30 James St., Liverpool, freight manager	1
H. Pierce, 30 James St., Liverpool	1
J. Fleetwood, 30 James St., Liverpool	1
Fidelity Trust Co., Philadelphia, Deposit Company	69,900
C. F. Torrey, 38 Leadenhall St., London, ship owner	1
International Mercantile Marine Co., New York	88
J. Bruce Ismay	6
H. A. Sanderson, Liverpool	1
H. Concannon, Liverpool, ship owner	1

The Fidelity Trust Co. of Philadelphiaphia is merely a holding company. The method of payment for the White Star Line and the business of Ismay, Imrie & Co. in 1904 was 25 per cent in cash, 75 per cent in preferred stock and 37½ per cent in common stock in the International Mercantile Marine Co. The shares of the Oceanic Steam Navigation Co. were valued on the basis of capitalizing the net profits of the year 1900 at 10 per cent. The dividends paid on the shares of the Oceanic Steam Navigation Co. in 1908 were 10 per cent, in 1909 20 per cent and in 1910, 30 per cent. The 1911 statement is not as yet available.

New Steamship Dimboola

The Dimboola, which was launched from the Neptune Works, of Swan, Hunter & Wigham Richardson, Ltd., on May 3, is being built to the order of the Melbourne Steamship Co., of Melbourne, Australia, being intended for their passenger and cargo service to Australia. She will run between Sydney, New South Wales, and Geraldton, West Australia, calling at various intermediate ports. She is expected to take about four weeks for the round trip.

The Melbourne Steamship Co. have a good trade on this route, carrying a large amount of general cargo and timber, whilst the passenger and tourist traffic are very good. Cattle, sheep and horses are also carried extensively.

The Dimboola is a finely proportioned steel steamer, 360 ft. in length by 50 ft. beam by 34 ft. deep, with forecastle and poop and bridge combined. She is fitted with a double bottom all fore and aft, and the safety of the passengers will be still further insured by an installation of wireless telegraphy.

The propelling machinery will consist of a set of quadruple-expansion engines, which, with the boilers, are being constructed at the Neptune Works on their Yarrow-Schlick & Tweedy system.

There is a fine promenade deck amidships with a house containing the first class music room and stateroom for 12 first class passengers. Below this, on the bridge deck amidships, is the first class dining saloon, a handsome room which will have sitting accommodation for about 60 passengers. On the same deck near at hand are staterooms for 60 first class passengers. Close to these is a very comfortable smoking room for first class passengers.

On the same deck, aft, the second class passengers have their dining saloon and a smoke room, whilst below are staterooms for 74 second class passengers.

The carriage of cattle being an important feature in the trade, space is arranged on the upper deck to carry about 150 head of cattle, whilst there are rooms for stockmen in attendance.

The cargo arrangements are very complete and the gear includes four steam cranes, three steam winches, a derrick for lifting specially heavy loads.

As the vessel will frequently be trading in very hot climates, special attention is paid to the ventilation of all spaces, and there is a refrigerating engine and insulated rooms.

Assistance to Shipping Urged

The Pan-American Trade Conference at a two days' session at the Waldorf-Astoria, New York City, May 16 and 17, adopted resolutions favoring a policy of commercial reciprocity between Pan-American countries, urging the passage of immediate legislation to remedy the lack of swift steamers from this country to South American ports and favoring permanent sample exhibitions in those countries.

Among those who made addresses at the conference were J. P. Santamarina, who talked of the possibilities of trade with the Argentine, and Dr. John D. Long, who talked on the same subject with reference to Brazil. Vincente Gonzales, in a talk on banking with Latin America, said that until there was a larger extension of credit by the banks, there was little hope of trade growing much. He pointed out that European banks discounted bills for eight to twelve months, while here 60 days was the maximum.

James L. Ewell spoke in favor of a ship subsidy and repeated arguments which he has used before congress and commercial bodies, one being the peril of war with Japan. Japan, he said, was aiming at supremacy in the Pacific and was rapidly building up a merchant marine by means of a subsidy.

New Dredger for Cardiff

Messrs. Wm. Simons & Co., Renfrew, launched, during May, the barge-loading bucket dredger, Robert Vassall, constructed to the order of the Taff Vale Railway Co., of Cardiff. The dredger, which was put into the water complete with steam up ready for work, has been constructed under Lloyds rules and special survey. The bucket ladder, which is constructed in accordance with the builders' latest practice and most improved form of girder work, is designed for dredging to a depth of 40 ft. below water level. The buckets are of special design and strength for dealing with various descriptions of material. The nominal bucket dredging capacity is 700 tons per hour. The vessel is propelled by one set of compound surface condensing engines supplied with steam from two marine multitubular boilers, constructed to Lloyds requirements for a working pressure of 120 lbs. per sq. in.

The propelling engines are also arranged for driving the dredging gear and change gear is provided so that a constant speed of engine can be maintained whether the dredger is working on soft or hard material.

Independent maneuvering winches are provided for regulating the cutter